

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

January 12, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-7

MARSHALL SPACE FLIGHT CENTER, Ala. -- The first flight instrument to be delivered for the Apollo Telescope (ATM) solar observatory is undergoing checkout at the NASA-Marshall Space Flight Center.

The instrument, an extreme ultraviolet coronal spectroheliograph, was manufactured by Ball Brothers Research Corp., Boulder, Colo., for the U. S. Naval Research Laboratory, Washington, D. C.

Technicians started checkout of the instrument early this week at the Marshall Center.

The ATM is a solar observatory which will operate from earth orbit to give scientists views of the sun undistorted by the earth's atmosphere. Measurements in the extreme ultraviolet and x-ray portions of the electromagnetic spectrum will be taken. The ATM will fly as a part of the Skylab cluster of spacecraft, to be launched in late 1972. The ATM is being assembled at MSFC.

Instruments from five principal investigators will be onboard the ATM.

The spectroheliograph is one of two instruments designed by Ball Brothers Research Corp. around concepts developed by Dr. Richard Tousey and Dewitt Purcell of the Naval Research Laboratory.

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The second NRL flight instrument, an extreme ultraviolet spectrograph, will be shipped from Boulder to the Marshall Center in March 1971. At the Marshall Center, the instruments are tested to assure that no damage occurred during the trip and then will be integrated into the flight ATM. Prototypes of both the spectroheliograph and spectrograph instruments have been tested and are being integrated into the prototype ATM.

Mounted in the ATM and pointed at the sun, the spectroheliograph will take photographs of the sun's coronal images in various wavelengths between 150 and 650 angstroms. Astronauts will operate the instrument from the control and display panel in the Skylab's Multiple Docking Adapter. Film recording the images will remain in cameras for return to earth.

The ATM instruments are the largest and most complex astronomical experiments to be designed for space studies. The NRL spectroheliograph weighs 244 pounds, is 123 inches long, 35 inches wide and 16 inches high.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

January 15, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-10

MARSHALL SPACE FLIGHT CENTER, Ala. -- Three aerospace teams, which include seven European firms as prospective members, have made proposals on the preliminary design of a Research and Applications Module (RAM) for the space agency.

The RAM is being considered by the National Aeronautics and Space Administration for use with the space shuttle and the space station currently being studied.

Making proposals to the Marshall Space Flight Center for the RAM work were teams headed by General Dynamics, Convair Aerospace Division; General Electric, Space Division and Martin Marietta, Denver Division.

General Dynamics has North American Rockwell Corp., TRW, Inc., and Bendix Corp. as proposed major subcontractors. The company also lists five foreign firms that are interested in supporting the RAM effort. These firms are M.A.T.R.A. of France; ERNO of Germany; SAAB of Sweden; Hawker-Siddeley of the United Kingdom; and Fiat of Italy.

General Electric proposes Lockheed Missile and Space Co. and Grumman Aerospace Corp. as major subcontractors. The G.E. proposal indicated that

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two foreign firms were interested in support roles. These are Messerschmitt-Boelkow-Blohm of Germany; and Thomson CSF of France.

Major subcontractors listed by Martin Marietta include McDonnell Douglas Astronautics Co.; International Business Machines; Honeywell, Inc., and Radiation, a subsidiary of Harris Intertype.

Three conceptual (Phase A) studies of the RAM were recently completed for NASA. This initial work was done by McDonnell Douglas/Martin Marietta; North American Rockwell/General Electric; and General Dynamics/Convair. The team selected for this new contract will carry the work through preliminary design.

NASA is currently studying the use of a space shuttle for low cost transportation to orbit and the space station as a semi-permanent facility which would have general and special purpose laboratories.

The RAM concept offers an economical way to extend the capability of both the shuttle and space station. These modules will provide versatile and economical laboratory facilities for investigations in many fields, including astronomy, space physics, bioscience, biomedicine, Earth surveys, materials sciences and processing, communications and navigation and advanced technology.

For the purposes of this preliminary design study, the first module launch would be planned for 1978 and be a part of a modular space station which would have an orbital lifetime of 10 years or more or alternatively operate in a shuttle sortie mode. The maximum size of a module would depend upon the shuttle's cargo capacity. This could be 14 feet in diameter and up to 58 feet long, with a weight of 20,000 pounds.

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Public Affairs Office  
George C. Marshall Space Flight Center  
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Marshall Space Flight Center, Alabama

January 21, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-11

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MARSHALL SPACE FLIGHT CENTER, Ala. -- An Apollo Telescope Mount (ATM) acceptance checkout station is nearing completion at the NASA-Marshall Space Flight Center.

Located in Quality and Reliability Assurance Laboratory, Building 4708, the ATM checkout station houses acceptance checkout equipment (ACE) and electrical support equipment.

First use of the facility will be the acceptance checkout of the ATM prototype. Prototype acceptance testing is scheduled to begin shortly after March 1.

The Marshall Center is building the ATM or solar observatory for the Skylab program. Launch of the Skylab cluster is scheduled for 1972. Instruments developed by five principal investigators will be used to probe the secrets of the sun from outside the Earth's atmosphere.

The clean room area is located in a 7,000 square foot portion of the Quality Lab building formerly used for acceptance testing of Saturn launch vehicle first stages. The area has been modified by two local contractors.

Bryson Construction, Decatur, Ala., built a "class 10,000" clean room in the checkout station under a contract totaling approximately \$250,000. The

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class 10,000 clean room, so-called because dust particles in the air one-half micron in size are controlled to a count of less than 10,000 per cubic foot, will house the ATM during extensive testing of its experiments and electrical systems. Temperature and humidity are also strictly controlled. This class 10,000 clean room is 35 by 40 feet and about 30 feet high. The remaining area will be maintained at a 100,000 cleanliness level.

An ATM mounting fixture has been installed in the floor of the clean room. This device is on a concrete pad which is four feet thick and 22 feet square. The pad is designed to isolate the ATM from vibration during checkout.

The control room area was modified by McAllister and McQuinn Construction Co., Inc., Huntsville, under a \$168,000 contract.

The area outside the class 10,000 clean room is a handling area and will contain an ATM solar wing deployment fixture and electrical support equipment. The solar wings will be put through acceptance tests here. McAllister and McQuinn modified the handling area under a \$41,000 contract.

A 20-ton crane has been installed in the class 100,000 area for use in handling the ATM.

The ACE includes computers and other checkout equipment formerly located at the Grumman Aircraft Corp., Bethpage, N. Y., one of 14 such stations used for checkout of Apollo spacecraft.

General Electric Co. personnel moved and installed the ACE station here and will operate and maintain it.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

January 25, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-13

MARSHALL SPACE FLIGHT CENTER, Ala. -- A mockup of one space station concept under study by the National Aeronautics and Space Administration has been completed and inspected by more than 150 representatives of government and industry attending a quarterly review here.

The 33-foot diameter space station mockup was used for a space station quarterly review last week at the NASA-Marshall Space Flight Center.

This mockup depicts a proposed 12-man station concept studied by the McDonnell Douglas Astronautics Company for the Marshall Center.

A 50-foot tall structure, the mockup has four decks and a large simulated power section. This space station concept calls for a 10-foot diameter tunnel section in the center. However, in the mockup the tunnel section and electrical power area have not been completed.

Decks one and three depict typical crew facilities and operations areas. The first deck is primarily devoted to living quarters for half of a proposed 12-man crew. The other six crewmen would live on deck three. Each man has a room of about 50 cubic feet of space. These compartments contain a desk, bed and personal storage.

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Other areas include a hygiene compartment, a galley, a convertible wardroom and a station control center.

An experiment area is located on the second deck. Laboratories here include a man-system integration lab; biomedical lab; data evaluation lab and bioscience lab. Also located on this deck is a dispensary and isolation wards.

Space station planners have proposed a general purpose laboratory for the fourth level. Activities which can be carried out there include data processing and evaluation; film preparation, equipment calibration and repair; and experiment and test isolation work.

A mockup of a detachable, free-flying experiment module has been attached to the mockup's fourth level. The 24-foot long cylinder was made by Martin Marietta Corp. and depicts a typical telescope experiment.

The McDonnell Douglas space station concept is based on guidelines which include using the two-stage Saturn V as a launch vehicle. Having a lifetime of 10 years in space, the space station would be placed in a low Earth orbit of about 250 miles. Crews would be rotated with a space shuttle.

McDonnell Douglas has recently been asked by the space agency to extend the space station study contract to include the preliminary design and planning for a modular space station of a smaller diameter. Several space station configurations and module combinations which could be assembled in orbit from modules sent from Earth in a space shuttle will be examined. The study is making use of the data produced in the preliminary design of the larger diameter station.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

February 5, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Joe Jones - residence - (205) 852-8847)

Release No. 71-22

MARSHALL SPACE FLIGHT CENTER, Ala. -- An early look at the flight data which piled up on Earth shows what everybody knew already -- the Saturn V rocket that sent the Apollo 14 crew into the heavens performed very well indeed.

The makers of the rocket, the Marshall Center and its contractors, have completed their preliminary evaluation of the records from the flight and conclude that there was no significant departure from the expected performance.

"This may have been the best Saturn V flight we've ever had," said Saturn manager Richard Smith. "It was in any event one of the best, and the few minor deviations that did occur were of no consequence."

The Saturn V, with more than three million parts, is generally thought to be one of the world's most complex and most powerful machines. It generates and precisely controls energy equal to more than one hundred million horsepower, applies it with split-second timing to send a 100,000-pound man-bearing spacecraft to an exact pinpoint in space.

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It has done so on seven different flights, now.

The vehicle that performed last Sunday was known as SA-509, the ninth in the series (which includes two unmanned flights). It was the heaviest one launched to date, weighing 6,423,000 pounds at liftoff. It was not launched on time, through no fault of the rocket. There was a delay of 40 minutes and two seconds because of unfavorable weather. Launch came at the Kennedy Space Center, Florida, at 3:03:02.271 CST.

All three propulsive stages and the instrument unit performed their essential functions satisfactorily.

There were problems with multiplexers in the instrument unit. A multiplexer is a device that receives data from many sources and combines it for transmission to the ground on a single circuit, allowing many sensors to share the same frequency. One multiplexer failed at .4 of a second before liftoff, and about half of the measurements assigned to it were lost. Still other data was lost through the malfunction of another multiplexer at three hours and two minutes into the flight.

None of this data, however, was important to the success of the flight. It merely reported on the operation of equipment.

In another area, the ride to orbit was not troubled by the excessive vibration or "pogo" that several previous Saturn V's have had.

Spacecraft commander Alan Shepard and his associates, Stuart Roosa and Edgar Mitchell, reported "a fine ride." Earlier riders of the

Saturn V had reported, on several occasions, excessive vibrations during the burning of first and second stages of the rocket. MSFC and its contractors have applied "fixes" as these instances of "pogo" were reported. On this trip, Astronaut Roosa did report "a slight pogo" at eight minutes and 40 seconds into the flight, during the second stage burn, but it was low enough that "it was not of any concern." He pointed out that he noticed the vibration possibly only because he was looking for it. It was not of the frequency that had caused concern on the last Saturn V flight.

The crew also reported a structural "buzzing" or "humming" during the second burn of the third stage. Data on that part of the flight has not yet been received at MSFC.

Flight data is being evaluated by MSFC and its main Saturn V contractors: Boeing Co., North American Rockwell, McDonnell Douglas and IBM. The director of this work is George McKay, head of the Flight Evaluation Working Group, Central Systems Engineering. Following are statistical highlights of their findings:

The first (S-IC) stage's center engine shutoff at 135.1 seconds after liftoff. The stage's four outboard engines cutoff at 164.1 seconds, nine tenths of a second early, when the vehicle was 36.3 nautical miles in altitude and 51.1 nautical miles downrange.

First and second (S-II) stage separation occurred at 164.8 seconds, one second early.

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S-II center engine cutoff occurred at 463.1 seconds, one second early, after a 297.6 second burn. The stage's outboard engines burned for 393.6 seconds. These four J-2 engines cutoff at 559.1 seconds into the flight, 2.2 tenths seconds later than expected. The Saturn V was 101.5 nautical miles high and 891.3 nautical miles down-range at the time.

Second and third stage (S-IVB) separation took place at 560 seconds, 2.1 seconds later than scheduled.

The S-IVB stage's first burn lasted for 140.5 seconds, 1.7 tenths seconds short, and cutoff came at 700.6 seconds after liftoff. A second burn of 352 seconds placed the Apollo spacecraft into a trans-lunar trajectory.

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Public Affairs Office  
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February 8, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Joe Jones - residence - (205) 852-8847)

Release No. 71-23

MARSHALL SPACE FLIGHT CENTER, Ala. -- A high-level advisory group responsible for guiding the National Aeronautics and Space Administration in all aspects of mission safety opened a two-day meeting at the NASA-Marshall Space Flight Center today.

The Aerospace Safety Advisory Panel, which is appointed by the NASA administrator, is headed by Dr. Charles D. Harrington, president, Douglas United Nuclear, Inc., Richland, Wash.

At Marshall the group is discussing safety aspects of the lunar roving vehicle, the Skylab cluster of spacecraft, and the proposed reusable space vehicle (space shuttle).

Other members of the panel are Bruce T. Lundin, director of the NASA-Lewis Research Center; Frank C. DiLuzio of the office of Sen. Clinton Anderson, chairman of the Senate Space Committee; Maj. Gen. Carroll H. Dunn, deputy chief, Army Corps of Engineers; Dr. Harold M. Agnew, director, Los Alamos Scientific Laboratory, University of California; Dr. John A. Hornbeck, President, Sandia Corp.; and Dr. Henry Reining, Jr., University of Southern California.

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February 12, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-25



MARSHALL SPACE FLIGHT CENTER, Ala. -- Dr. William R. Lucas has been named deputy director, technical, at the National Aeronautics and Space Administration's Marshall Space Flight Center.

The appointment was announced today by Dr. Eberhard Rees, Marshall Center director. Dr. Lucas' appointment is effective Feb. 15.

Dr. Lucas has been director of the Marshall Center's Program Development directorate since December 1968.

Erich W. Neubert has ~~been~~ acting as deputy center director, technical.

The position of director of Program Development will be assumed by James T. Murphy in an acting capacity. Murphy has been serving as associate director for management in Program Development.

Dr. Lucas, 48, is a long-time member of the rocket development team in Huntsville. He became a staff member of the Guided Missile Development Division of Redstone Arsenal in June 1952. When the Guided Missile Development Division became the nucleus for the Army Ballistic Missile Agency in early 1956, he was transferred to the new agency.

He was chief of the Materials Branch of the Development Operations Division of ABMA until July 1, 1960.

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He joined the Marshall Center when it was established in 1960 as a NASA field center.

During 1960 to 1968, Dr. Lucas held progressive positions of technical and managerial responsibility within the Propulsion and Vehicle Engineering Laboratory. During the major portion of this time, he directed the activities of the Materials Division. In 1966 he became Propulsion and Vehicle Engineering Laboratory director.

A native of Newbern, Tenn., Dr. Lucas holds a bachelor of science degree in chemistry from Memphis State College, and a master of science and doctorate in metallurgy from Vanderbilt University, Nashville, Tenn.

Dr. Lucas is a member and director of numerous engineering and technical societies. He is the author of several publications and owns two patents. He is prominent as a member or director of many community activities in Huntsville, and serves as a trustee of Mobile College.

His awards include the NASA Medal for Exceptional Scientific Achievement, the Hermann Oberth Award, and NASA Exceptional Service Medals for contributions to the Apollo 8 and Apollo 11 lunar orbital missions.

He is married to the former Miss Polly Troiti of Memphis. Dr. and Mrs. Lucas have three children, Donna Jean, William R., Jr., and Mike.

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Marshall Space Flight Center, Alabama

For Release:

February 21, 1971

Phone: (205) 453-0034, 453-0035  
(Charles Kurtz - Fayetteville - (615) 433-4958)

Release No. 71-29

MARSHALL SPACE FLIGHT CENTER, Ala. -- Twenty-eight technical papers on space shuttle, space station and nuclear shuttle navigation will be presented at a national meeting of the Institute of Navigation Feb. 24-25 in Huntsville.

Six technical sessions are scheduled in two auditoriums at the National Aeronautics and Space Administration's Marshall Space Flight Center. The Marshall Center is host for the meeting.

Principal speakers at the two-day meeting include Kraft Ehricke, North American Rockwell Corp., Dr. Robert H. Cannon, assistant secretary of Department of Transportation, and Maj. Gen. Edwin I. Donley, commander of U. S. Army Missile Command.

Ehricke will discuss "Extraterrestrial Imperative" at a luncheon meeting Feb. 24 at the Redstone Arsenal Officers' Open Mess.

Dr. Cannon will discuss "Transportation and the Quality of Life" at a banquet Feb. 24 at the Carriage Inn. Gen. Donley will discuss "Army Navigation Needs" at a luncheon Feb. 25 at the Officers' Open Mess.

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2/19/71



Dr. Eberhard Rees, MSFC director, will welcome the scientists and space engineers to the meeting.

Technical papers devoted to the latest developments in space navigation technology will be presented to the estimated 150 attendees at morning and afternoon sessions.

Technical sessions will be held in the Morris Auditorium and the Huntsville Operations Support Center in Building 4663.

Sessions scheduled in Morris Auditorium include: Session I, "Navigation Techniques," 9:30 a.m. Wednesday; Session III, "Inertial Technique," at 2 p.m. Wednesday; Session V, "Space Shuttle," at 9:30 a.m. Thursday; and Session VI, "Nerva," 2 p.m. Thursday.

Sessions scheduled for the Huntsville Operations Support Center include: Session II, "Space Applications and Man/Machine Systems, 9:30 a.m. Wednesday; and Session IV, "Skylab," 9 a.m. Thursday.

Dr. Walter Haeussermann, director of MSFC's Central Systems Engineering, is general chairman for the meeting.

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2/19/71

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

February 22, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Maurice Parker - residence - (205) 859-0121)

Release No. 71-30

MARSHALL SPACE FLIGHT CENTER, Ala. -- The first flight model lunar roving vehicle (LRV) has begun six weeks of extensive acceptance tests leading to its scheduled April 1 delivery to the National Aeronautics and Space Administration.

Final assembly and modification was recently completed by the Boeing Co. at its Kent, Wash., assembly plant for the NASA-Marshall Space Flight Center, managing NASA center for the LRV program.

Boeing is building three flight model lunar roving vehicles for use during the last three Apollo lunar exploration missions. The first flight model will transport two astronauts on three extra-vehicular exploration traverses during the Apollo 15 lunar mission in late July of this year.

Apollo 15 is scheduled to land between Hadley Rille--a half-mile-wide valley 600 feet deep and 60 miles long--and the Apennine Mountains, rising as high as 8,000 feet above the moon's surface.

During the next six weeks, the first flight LRV will be subjected to tests that will check its ability to withstand the vibrations, shocks, vacuum,

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and temperature extremes that it will encounter during launch, lunar landing and traverse operations.

Special deployment tests will check the vehicle's ability to be folded into a small quadrant of the lunar module's descent stage during flight, then be deployed quickly and easily by one astronaut. Preliminary mechanical and electrical subsystems tests have already been completed.

The second LRV flight unit is now being manufactured at the Boeing facility. It is scheduled to begin its own test program by the last week of March, and be delivered to NASA in April.

The third flight model, now in early fabrication and sub-assembly, is scheduled for delivery to NASA by late May.

The roving vehicle will be 10 feet, 2 inches long; slightly more than 6 feet wide; 45 inches high; and have a 7.5-foot wheelbase. The vehicle will weigh about 480 pounds and will be able to carry a 1,000 pound payload -- two astronauts and their portable life support systems, plus 200 pounds of scientific experiments, tools and lunar soil and rock samples. Batteries power the LRV.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 1, 1971

Phone: (205) 453-0034, 453-0035  
(Joe Jones - residence - (205) 852-8847)

EDITORS: NASA's Apollo 15 mission, now set for July 26, 1971, is to use for the first time a small lunar roving vehicle, presently under development. Attached are background information and three pictures of this vehicle.

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 2, 1971

IMMEDIATE RELEASE

Phone: (205) 453-0034, 453-0035  
(Joe Jones - residence - (205) 852-8847)

Release No. 71-37

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration yesterday asked three aerospace firms for proposals on the development of the main engines that will power a two-stage reusable launch vehicle (space shuttle).

The firms are the Aerojet General Liquid Rocket Co., Sacramento, Calif.; the Pratt and Whitney Division of United Aircraft Corp., West Palm Beach, Fla.; and the Rocketdyne Division of North American Rockwell Corp., Canoga Park, Calif.

Since last June all three companies have been performing preliminary design and definition studies of the shuttle engine under independent, parallel contracts costing \$6 million each. Now one of the companies is to be chosen to develop the engine. Proposals are due at the NASA-Marshall Space Flight Center April 21. The selection should be made and the contract placed in force by mid-summer.

The reusable space shuttle will be used, beginning late in this decade, to transport people and cargo from Earth to low Earth orbit. Concepts

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call for an airplane-like booster and orbiter stages which would be launched vertically in a piggyback arrangement; they would land separately, horizontally, like airliners.

The same basic engine will power both stages, although the orbiter engine will have a much longer exhaust nozzle.

The first stage would have 12 engines of about 550,000 pounds thrust each. It would lift from Earth to about 250,000 feet altitude and then the orbiter would separate. The booster would fly back to a horizontal Earth landing, while the orbiter would continue into orbit under the power of two engines, each with a thrust of 632,000 pounds in the space vacuum where it is designed to operate.

The engine will use liquid hydrogen and liquid oxygen and may be gimballled in flight for control purposes. The two orbiter engines are about 23 feet long with the exhaust nozzle deployed. Booster engines, having no exhaust nozzle extension, will be about 13 feet long. The booster engines will weigh about 7,400 pounds each while the orbiter engines are to weigh about 8,800 pounds each.

Like the rocket engines that powered Saturn rockets, they will undergo extensive ground static firings before flight tests.

All the engines will be throttled to vary the thrust during power flight. All are to be operated at high pressure to gain maximum performance with less engine weight.

They are to be designed for sustained operations much like modern commercial airliners.

The space shuttle is envisioned as having a capability of 100 or more flights from Earth. Missions include deployment of unmanned spacecraft, satellite repair and retrieval, space rescue, short-duration orbital science and applications missions, and eventually space station supply.

The engine is the "pacing" item in the shuttle development and thus requires the earliest development start. While this work continues, other firms are carrying out preliminary design of the overall shuttle craft.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 10, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Don Lakey - residence - 205/883-0976)

Release No. 71-42

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration today asked 19 companies with experience in communications and navigation to bid on a 10 month study effort that would define experiments and instrumentation necessary for a manned communications and navigation research laboratory.

Such a laboratory could be launched late this decade by a reusable vehicle known as a space shuttle. The laboratory is envisioned as one of a class of Research Applications Modules that would be flown aboard the shuttle.

The firms solicited for the study are to respond with proposals in 30 days.

Such a laboratory would be used for various demonstrations, measurements and tests. Generally, it would be oriented toward improving communications and navigation on Earth. Some of the experiments discussed include laser communications, satellite navigation techniques, terrestrial noise measurements, transmitter breakdown tests, noise identification and autonomous navigation systems for space.

The work will be monitored by the Program Development Directorate at the NASA-Marshall Space Flight Center and is under the overall direction of the NASA Office of Manned Space Flight and the NASA Office of Space Science and Applications.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 29, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-52

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MARSHALL SPACE FLIGHT CENTER, Ala. -- Requirements for seven astronomy experiments for a proposed High Energy Astronomical Observatory (HEAO) will be defined under contracts recently awarded by the space agency.

The National Aeronautics and Space Administration's Marshall Space Flight Center is directing the HEAO experiment definition phase (Phase B) studies.

The seven months study contracts were awarded by the Marshall Center, acting for NASA's Office of Space Science and Applications.

If the HEAO becomes an approved flight program after the definition phase, the instruments studied will be considered for the first HEAO mission now planned for mid-1975.

Study contracts awarded include:

/ "Large Area Cosmic Ray Detector for Extremely Heavy Nuclei," California Institute of Technology, \$57,306; <sup>2</sup>Washington University, St. Louis, Mo., <sup>3</sup>\$111,179; and University of Minnesota, \$32,000.

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4 "Integrated X-Ray Modulation Collimator," Massachusetts Institute of Technology, \$199,991.

5 "A Sky Survey Experiment for 0.3-10 MeV for Gamma-Ray Sources," University of California at San Diego, \$187,318.

6 "High Energy X-Ray Study with Modulation Collimators," Massachusetts Institute of Technology, \$199,882.

"Large Area X-Ray Detector," to Naval Research Laboratory, \$200,000.

8 "Focusing X-Ray Experiment," Columbia University, \$200,000.

9 "High Energy Cosmic Ray Experiment," to Goddard Space Flight Center, \$200,000.

The HEAO spacecraft is seen as a 21,000-pound, 30-foot-long craft, designed to carry relatively few but heavy instruments accounting for more than half its weight. The spacecraft is planned for launch by a Titan IIID rocket into a 230-statute-mile orbit.

Principal investigators for the seven experiments include:

Dr. M. H. Israel, Washington University, St. Louis, Mo., Dr. E. C. Stone, California Institute of Technology; and C. J. Waddington, University of Minnesota, for the "Large Area Cosmic Ray Detector for Extremely Heavy Nuclei" experiment.

Dr. H. V. D. Bradt, Massachusetts Institute of Technology, and Dr. Herbert Gursky, American Science and Engineering, Cambridge, Mass., for the "Integrated X-Ray Modulation Collimator."

Dr. L. E. Peterson, University of California at San Diego, for  
"A Sky Survey Experiment for 0.3-10 MeV for Gamma-Ray Sources."

Dr. W. H. G. Lewin, Massachusetts Institute of Technology, for  
"High Energy X-Ray Study with Modulation Collimators."

Dr. Herbert Friedman, Naval Research Laboratory, "Large Area  
X-Ray Detector."

Dr. Robert Novick, Columbia University, for "Focusing X-Ray  
Experiment."

Dr. Jonathan F. Ormes, Goddard Space Flight Center, for the  
"High Energy Cosmic Ray Experiment."

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 31, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-55

MARSHALL SPACE FLIGHT CENTER, Ala. -- A contract for the supply and delivery of liquid hydrogen for all government aerospace use in the eastern United States has been awarded to Air Products and Chemicals, Inc., by the NASA-Marshall Space Flight Center.

The one-year contract will begin April 1 and end March 31, 1972. It is valued at \$2,249,700.

NASA's Saturn launch vehicles are the prime users of liquid hydrogen, which is the propellant for the second (S-II) and third (S-IVB) stages of the Saturn V vehicle, and for the second (S-IVB) stage of the Saturn IB vehicle.

NASA, through the Marshall Center, supplies liquid hydrogen for all government agencies in the eastern U.S., including the Atomic Energy Commission and the U.S. Air Force.

Three Saturn V vehicles will be used to launch the three remaining Apollo Program lunar exploration missions, and one vehicle will launch the Skylab Program's Saturn Workshop into Earth orbit. Three Saturn IB vehicles will launch astronaut crews for the Skylab Program. The Marshall Center is responsible for management and operation of all Saturn vehicles.

Air Products and Chemicals, Inc., is headquartered in Allentown, Pa., but its liquid hydrogen supply and delivery work for NASA will be done from a plant at New Orleans, La.

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107. Room 101  
Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 31, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-56

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration has modified its contract with the Boeing Co., Huntsville, Ala., for the design, development, manufacture, and delivery of three lunar roving vehicles for the Apollo Lunar Exploration Program.

Total estimated cost to contract completion is \$37.8 million. Growth in contract cost from the original estimate of approximately \$20 million results from the increased effort required to solve the number of technical problems which developed as the work progressed.

The contract includes procurement of three lunar roving vehicles, a number of test articles, plus subsystems for a fourth vehicle to be used as spares.

The lunar roving vehicle will be sent to the moon on the Apollo 15 mission, scheduled for July 26, and again on Apollos 16 and 17 next year. Boeing delivered the first flight vehicle March 15, two weeks ahead of schedule, and deliveries of the remaining two flight models are anticipated earlier than contract requirement.

-more-

The four-wheel vehicle will provide transportation for two astronauts and their tools, scientific equipment and lunar samples collected during several traverses across the lunar surface. The astronauts and equipment will weigh a thousand pounds - twice the weight of the vehicle itself.

Boeing was selected in October 1969 as the vehicle development contractor for the NASA-Marshall Space Flight Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

March 31, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-57

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MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a \$49,900 ~~fixed price~~ contract to Lockheed Missiles and Space Corp. for work in the High Energy Astronomical Observatory (HEAO) Program.

The space agency plans to launch the HEAO in mid-1975 with the Titan IIID booster and the Lockheed HEAO orbit adjust stage and payload shroud.

The HEAO is proposed for launch into a 200-nautical mile orbit and will carry heavy instruments designed to study radiation from space. This radiation--X-rays, gamma rays and high energy cosmic rays--has previously been seen only briefly by sounding rockets and balloons, and by small satellites.

The orbit adjust stage, as applied to HEAO, would be an adaptation of the single engine stage which was developed by Lockheed on another government contract. It would be used to circularize the HEAO's orbit in a 200-nautical mile Earth orbit.

Lockheed will also study the hardware needed to adapt the stage to the Titan vehicle.

Spacecraft and experiments for the first HEAO mission are being studied under other definition contracts.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
GEORGE C. MARSHALL SPACE FLIGHT CENTER  
MARSHALL SPACE FLIGHT CENTER, ALABAMA 35812

REPLY TO  
ATTN OF:

PA-DIR

April 2, 1971

NOTE TO EDITORS:

The NASA-Marshall Space Flight Center will hold another press briefing on the Skylab Program April 21, beginning at 9:15 a.m. You are invited to attend or send representation to the one-day meeting, which is a follow-up to a two-day session held here last June. We are sending a tentative agenda for the meeting.

There will be a short general briefing and opportunity for private interviews; we also see this as a good photographic story.

The Skylab Saturn Workshop here has been updated and converted into a 1-G trainer for astronaut use; in many cases flight-type interior hardware has been installed in place of the mockups previously used. Also, the first flight-type ATM (Apollo Telescope Mount) has been completed here and will be available for photography.

In addition, displayed independently will be equipment and provisions which are to be launched in the Workshop.

Marshall Center officials, including the director and his deputies and program managers, will be available for interviews. While the main subject will be Skylab (including the Workshop and ATM), other subjects may be discussed if you desire. We are attaching a list of officials who plan to be available, barring unforeseen circumstances. Should you want to see others, or discuss subjects other than those represented by this group, we will make every effort to comply.

Please let us know who will represent your organization, whether you will want individual interviews, and with whom. You may write us or call me or Joe Jones at 205-453-0034.

Bart J. Slattery, Jr.  
Director of Public Affairs

2 Enclosures



# SKYLAB PRESS BRIEFING

April 21, 1971

## Tentative Agenda

9:15 a.m.	Welcome by Dr. Eberhard Rees, Marshall Center Director
9:30 a.m.	Overall Skylab briefing, Leland Belew, Manager Skylab Program Office
10:30 a.m.	Coffee
10:40 a.m.	Tour and photography in mockup area, Bldg. 4619
12 noon	Lunch at Officers Club
1:15 p.m.	Photography at Apollo Telescope Mount prototype
2:00 p.m.	Individual interviews, arranged in advance

MARSHALL CENTER OFFICIALS AVAILABLE FOR INTERVIEWS  
AT SKYLAB PRESS BRIEFING APRIL 21, 1971

Dr. Eberhard F. M. Rees	Marshall Center Director
Dr. William R. Lucas	Deputy Director, Technical
Richard Cook	Deputy Director, Administrative
Dr. Ernst Stuhlinger	Associate Director for Science
Lee B. James	Director Program Management
Dr. Hermann K. Weidner	Director Science and Engineering
James Murphy	Acting Director Program Development
Leland Belew	Manager Skylab Program Office
Karl Heimburg	Director Astronautics Laboratory
Stan Reinartz	Deputy Director Skylab Program Office
Dr. George McDonough	Technical Assistant, Science and Engineering
George Hardy	Program Engineering and Integration Project, Skylab Program Office
William K. Simmons	Saturn Workshop Project, Skylab Program Office
Rein Ise	Apollo Telescope Mount Project, Skylab Program Office
Dr. James B. Dozier	Technical Assistant for Apollo Telescope Mount Science, Space Sciences Laboratory
S. F. Morea	Lunar Roving Vehicle Project, Saturn Program Office
Robert O. McBrayer	Manned Systems Integration, Astronautics Laboratory

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

For Release:

April 4, 1971

Phone: 205/453-0034, 453-0035  
(Don Lahey - residence - 205/883-0976)

Release No. 71-59

MARSHALL SPACE FLIGHT CENTER, Ala. -- Space vehicle propulsion systems with an operational life requirement of 100 flight missions will be discussed in a conference at the NASA-Marshall Space Flight Center Tuesday and Wednesday, April 6-7, 1971.

About 400 persons from aerospace companies and government agencies skilled in propulsion will attend the meeting. Approximately 50 of these will be from foreign countries -- mostly Europe.

This is one in a series of space shuttle technology conferences being held by NASA at several locations from March through May.

The conferees will be discussing propulsion concepts for a new type of space vehicle -- the space shuttle -- which would fly from Earth to Earth orbit up to twice a month over a period of ten years.

The shuttle is seen as a more economical approach to a variety of space missions. All the missions would be manned, but during some flights unmanned satellites could be deposited or retrieved from Earth orbit.

Currently, Apollo flights to the moon use expendable Saturn V launch vehicles. Saturn rockets with various thrust levels have performed during 24 missions into space.

-more-

4/1/71

Chairman of the conference will be Jerry Thomson, who is chief engineer for the space shuttle main engine at MSFC. Thomson points out that the shuttle will demand major advancements in propulsion technology beyond those applied in the Apollo program. He said new requirements mainly concern the need for lightweight, high-performance, reusable oxygen/hydrogen engines and associated propellant feed systems.

The shuttle is projected as a vehicle about 250 feet long which would take off vertically like a rocket. The booster would be shaped like a swept wing airplane and would have 12 engines.

During the launch phase, the booster would have another airplane like vehicle--called an orbiter--riding piggy-back. At an altitude of about 250,000 feet, the orbiter would separate from the booster and continue to fly into space under the power of two engines in the tail.

Once in orbit, it could deliver cargo or be used as a space laboratory for up to a week. It normally carries a two-man crew, but it could carry additional passengers in the cargo or passenger compartment, which will be about 15 feet in diameter and nearly 60 feet long.

After separation, the booster would return to Earth and land like any large airplane. It, too, would have a two-man crew. Following the space mission, the orbiter would also return to Earth and land like an airplane.

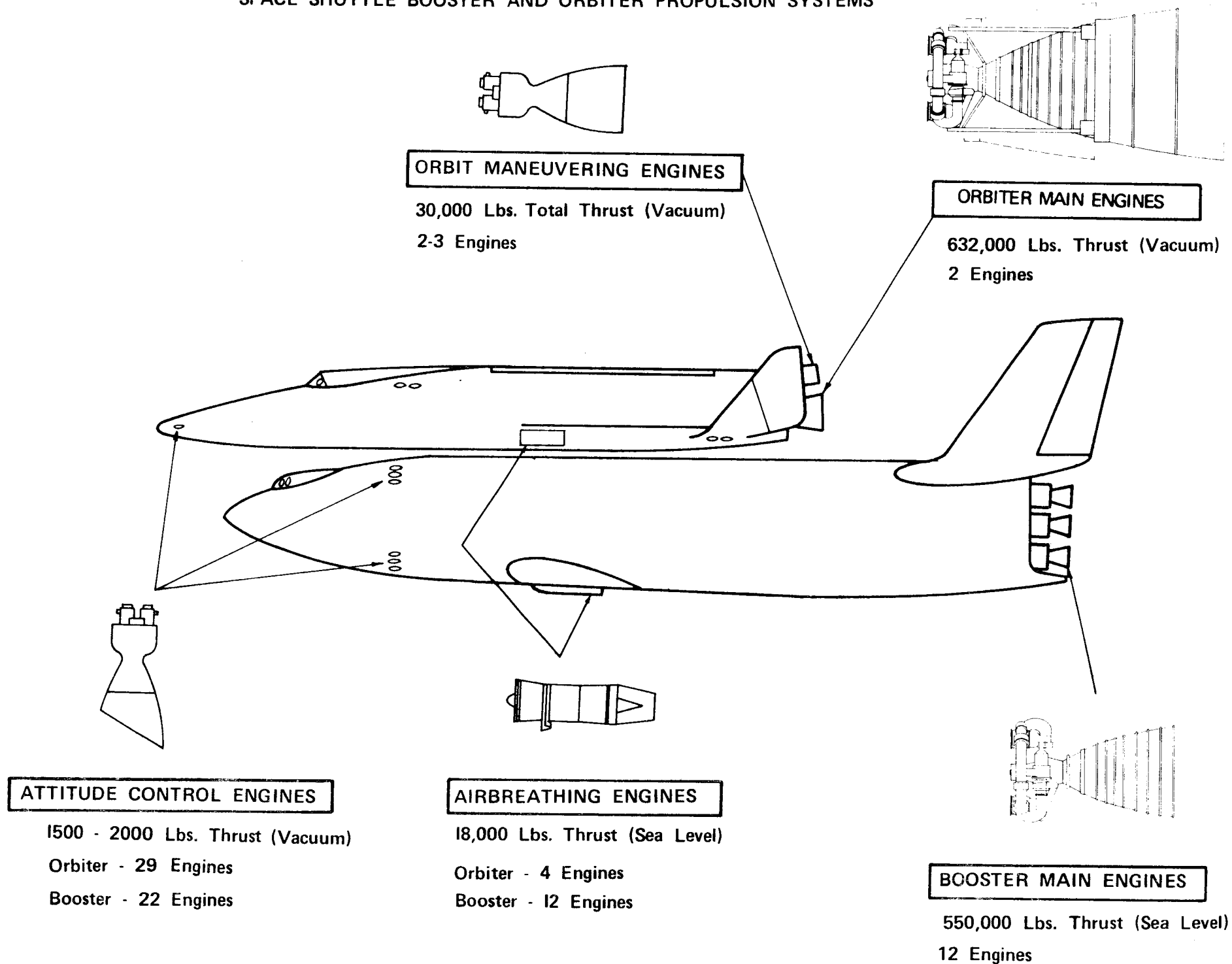
NASA hopes to have an operational space shuttle by 1979.

The meeting, which will be held in MSFC's Morris Auditorium, consists of five sessions covering main propulsion, auxiliary propulsion, air-breathing propulsion, cryogenics and auxiliary power units.

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## SPACE SHUTTLE BOOSTER AND ORBITER PROPULSION SYSTEMS



Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

April 8, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0034  
(Joe Jones - residence - 205/852-8847)

Release No. 71-60

MARSHALL SPACE FLIGHT CENTER, Ala. -- A contract held by the Chrysler Corporation has been modified by the National Aeronautics and Space Administration to authorize additional work in the Saturn IB program.

Chrysler is the prime contractor for the first stage of the Saturn IB, which it assembled at the Michoud Assembly Facility in New Orleans, an element of the NASA-Marshall Space Flight Center.

Under the present \$29,136,622 modification, the company will maintain nine Saturn IB boosters in storage. Three of the nine vehicles are earmarked for the Skylab program and will be launched in 1973. Those three, plus a fourth which will serve as a backup, will be maintained and modified as necessary under terms of this contract. Prelaunch checkout of the Skylab vehicles will also be accomplished under this modification. The period of performance is from Jan. 1, 1971 to August 15, 1973.

Six of the vehicles are located at the Michoud Facility and the other three are at the Marshall Space Flight Center here.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

April 14, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-64

MARSHALL SPACE FLIGHT CENTER, Ala. -- Space engineers and astronauts are studying Skylab Workshop storage facilities at a review this week at the NASA-Marshall Space Flight Center.

A final portion of a Crew Compartment Stowage Review started Wednesday (April 14) and will continue through Friday.

The workshop will be a segment of the Skylab cluster planned for launch by the space agency in 1973. Three three-man crews will live and work in the workshop for periods of 28 to 56 days.

A workshop trainer/mockup is being used for the review. The review opened last week with a bench check of items which will be stored in the workshop's flight version. One piece of equipment from each type planned for the Skylab flight was displayed for inspection by the review team.

The equipment was stowed away again for the final part of the study. Astronauts taking part are performing workshop activation procedures, reviewing each compartment's storage areas and running through deactivation procedures.

Astronauts participating include Alan Bean, Charles Conrad, Joseph Kerwin, Paul Weitz, Walter Cunningham, Gerald Carr, Russell Schweickart, William Lenoir and Richard Truly.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

April 20, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Don Lakey - residence - 205/883-0976)

Release No. 71-67

MARSHALL SPACE FLIGHT CENTER, AL -- Thermal simulation equipment will be installed at the NASA-Marshall Space Flight Center soon for research and development testing of prototype heat protection systems for Space Shuttle.

Under a \$1,081,343 contract, Research, Inc., of Minneapolis will design, fabricate, install and check out the electrical heating device which will produce up to 2500 degrees Fahrenheit on the lower surface and temperatures of up to 1800 degrees Fahrenheit on the top surface of test articles.

Work on the heating device will be funded in increments starting with the preliminary design phase, which is costing \$100,000.

The heating apparatus will be installed in an existing structural test facility in the Marshall Center's West Test Area. Scale models of potential thermal protection systems as large as 12 by 13 feet can be accommodated in the facility. The test articles will contain super cold liquid hydrogen and nitrogen while being tested in order to closely simulate flight hardware environments.

-more-



The Marshall Center is already involved in Shuttle technology, engine development work and other related activities.

The heating device will cause the test articles to experience those temperatures expected during Shuttle ascent to space and reentry through the Earth's atmosphere. Under these conditions and applied structural loads, engineering data will be acquired to aid in the selection of a thermal protection system.

Two government furnished transformers will provide the necessary electrical power (10,000 KVA) for the heater.

The Space Shuttle is envisioned as a reusable launch vehicle and transport to carry people and cargo between Earth and low Earth orbit. First flights are planned late this decade.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

April 21, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-68

MARSHALL SPACE FLIGHT CENTER, AL -- The National Aeronautics and Space Administration has selected Management Services, Inc., Oak Ridge, TN, for award of a contract for institutional support to the MSFC Technical Services Office. Five companies had submitted proposals for this work.

The contractor's proposal for the one-year, cost-plus-award-fee contract is approximately \$3.5 million. The contract will be effective June 1, 1971, and will contain provisions for two additional one-year periods.

Management Services, Inc., will provide vehicle support, logistics support, chemical purging, miscellaneous crafts support, ground and landscape maintenance, minor construction, and incidental services relative to the upkeep of Center facilities.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

April 23, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-71

MARSHALL SPACE FLIGHT CENTER, AL -- The first flight model Lunar Roving Vehicle (LRV) will be installed aboard the Apollo 15 lunar module Sunday, April 25, at the NASA-Kennedy Space Center, FL.

The LRV will transport astronauts on three exploration traverses of the Moon's Hadley-Apennine area during the Apollo 15 mission, set for launch July 26. The LRV is managed by the NASA-Marshall Space Flight Center and was built by the Boeing Co.

An installation review meeting will be held at KSC Monday afternoon, April 26, followed by an LRV stowage meeting with Apollo Program director Rocco A. Petrone Tuesday, April 27. Marshall Center managers who will attend the meetings are Richard G. Smith, Saturn program manager; S. F. Morea, Lunar Roving Vehicle project manager; and Joseph B. Jones and James M. Sisson, both of the LRV Project Office.

The LRV will be installed in a triangular storage bay of the Lunar Module's descent stage. The forward and aft sections of the LRV's

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chassis will be folded inward over the center chassis. The four wheels will also be folded inward, fitting the package into an area 66 inches wide, 59.5 inches high, and 48.5 inches deep. While stowed, the LRV will be supported at three attach points.

The Lunar Module is on a test stand in the Manned Spacecraft Operations Building at KSC. The spacecraft will be moved to the Vehicle Assembly Building May 8 to be mated with the Saturn launch vehicle and the Apollo Command and Service Modules. The complete Apollo 15 vehicle will be rolled out to Pad A, Launch Complex 39, on May 11.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

April 26, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-74

MARSHALL SPACE FLIGHT CENTER, AL -- The National Aeronautics and Space Administration's Marshall Space Flight Center will sponsor a two-day technical symposium May 4-5 on the results of the recently completed Tektite II undersea research program.

Tektite II was an underwater living and research experiment conducted off the Virgin Islands last year in which 48 aquanaut scientists and engineers, in crews of five, lived and worked for up to 30 days in a "habitat" on the ocean floor.

The symposium, "Tektite II: Men Undersea," will emphasize the NASA involvement in the program, although a brief overview of Tektite II will be included.

The underwater research program was a joint effort of many government agencies, universities and private research organizations. Leading the effort was the Interior Department. NASA's interest lay mostly in the similarity between such a confined existence and life and work aboard a space station for long durations.

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Areas to be covered in the symposium include a description of the habitat, the ocean floor program, the earth resources and food evaluation activities, and the man-systems integration program.

About 150 persons are expected to attend.

Karl Heimburg, director of the MSFC Astronautics Laboratory, will welcome the group. Other MSFC participants will include Harry H. Watters, a principal investigator, Chester May and Richard Heckman.

Other prominent program participants will include Dr. James W. Miller, formerly of the Interior Department, Tektite II manager; and Richard Sprince of NASA Headquarters, NASA Tektite director.

The meeting will be held in Morris Auditorium.

The final afternoon will be given over to a tour of the Skylab Orbital Workshop trainer at MSFC.

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EDITORS: You are invited to cover this symposium. If you plan to attend or if we can help you in any way, write us or call, 205/453-0041.

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

April 27, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 852-8847)

Release No. 71-75

MARSHALL SPACE FLIGHT CENTER, AL -- Dr. F. A. Speer has been named manager of a newly-augmented High Energy Astronomical Observatory (HEAO) task team at the Marshall Space Flight Center, National Aeronautics and Space Administration.

The appointment was made by Dr. Eberhard Rees, MSFC director, and was effective yesterday.

MSFC scientists and engineers are nearing completion of the early phases of HEAO spacecraft preliminary definition. The NASA associate administrator for space science and applications has assigned management responsibility to Marshall for work leading to the final design and hardware development phases of the project.

Dr. Rees said that when congressional authority is received to proceed with the development and test phase of the HEAO, the HEAO group, now in the Program Development Directorate, will be established in the Program Management directorate of MSFC.

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The HEAO is a proposed unmanned astronomical observatory intended for flight in 1975. The satellite would carry heavy instruments into space to study very energetic radiation -- x-rays, gamma rays and high-energy cosmic rays.

Under Dr. Speer's direction, the HEAO team will continue the project feasibility and definition work, the remainder of which is mostly in the area of defining experiments, doing early design on the payload shroud and planning the integration of the satellite with the launch vehicle.

The director pointed out that staffing arrangements for the augmented HEAO Task Team will be complete by about June 1.

Since 1965, Dr. Speer has headed the Mission Operations Office in Program Management.

Dr. Speer came to Huntsville in 1955. A native of Germany, Dr. Speer was assistant professor at the Technical University of Berlin and physics editor of the Central Chemical Abstract Magazine in Berlin prior to coming to this country. He earned a master's degree and a doctorate in physics at the Technical University.

He became a U.S. citizen on Nov. 23, 1960.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 4, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-78

MARSHALL SPACE FLIGHT CENTER, AL -- A large unmanned balloon-borne astronomical telescope, called Stratoscope II, will be launched later this year from the NASA-Marshall Space Flight Center.

The Stratoscope II's 36-inch astronomical telescope will be carried aloft by the balloon in the fall.

The space agency recently assigned the project management responsibility to the Marshall Center as part of a project reorganization.

Princeton University scientists previously directed the Stratoscope II project and will retain scientific control of the astronomical objects to be photographed on future flights. Dr. Robert Danielson of Princeton University Observatory is the principal investigator.

Scientific targets for the next Stratoscope II flight include nearby Galaxies M31 and M32; Planetary Nebula (NGC 7662); Orion Nebula; and the Planet Saturn. Astronomers find Galaxies M31 and M32

-more-

interesting because they are relatively near (only 1.5 million light years away) and the Stratoscope II telescope should allow a detailed look at their structure. Early star formation will be studied by observing the Orion Nebula and the latest state of a star will be seen in the Planetary Nebula.

Seven previous flights have all been from the National Center for Atmospheric Research's Scientific Balloon Flight Station near Palestine, TX. The U.S. Army has granted permission for future flights to be launched from the Redstone Arsenal Airstrip.

Perkin-Elmer Corp., Norwalk, CT, developed the telescope and suspension system. The firm has a contract to continue some work under Marshall Center management.

D. B. Gardiner, Products Office of Science and Engineering, is the Stratoscope II project manager.

A small launch balloon and a mammoth main balloon, which measures some 210 feet in diameter at altitude, lift the four-ton telescope and equipment to about 80,000 feet in some 110 minutes. At that height, ground based astronomers point the highly accurate diffraction-limited optical system toward targets chosen for scientific observation.

Total length of the train of the system, consisting of the launch balloon, main balloon, parachutes and the telescope extends 660 feet at launch.

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Launch will occur in the late afternoon or early evening so the telescope will be at 80,000 feet for the longest possible time during darkness. Ground controllers vent the main balloon at the end of the mission to return the payload to the ground. Parachutes can be used to soft-land the telescope.

Gardiner said one Stratoscope II launch a year is planned. An August launch is planned, he said, because prevailing high altitude winds at this time of year will cause the balloon to drift toward the west, and thus come down in sparsely populated areas.

The telescope is aimed by radio command, using data from the television cameras flying as a part of the balloon's payload. This procedure enables astronomers to control the telescope in flight from their ground station. Scientific data is recorded on 70-mm film and 35-mm film and stored in the camera magazines.

Following each Stratoscope flight, the film is recovered after the telescope returns to the ground. The telescope, electronics and mechanical systems are refurbished, modified and tested for the next flight.

Perkin-Elmer is refurbishing the telescope's optics, structure, electronics and thermal conditioning systems. The Marshall Center is refurbishing electrical and electro-mechanical systems, pointing and control devices, instrumentation and communications equipment and launch equipment.

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Personnel from the National Center for Atmospheric Research will come to the Marshall Center to launch the mammoth balloon.

A "stratoport" building has been moved by the Marshall Center from the Perkin-Elmer plant in Norwalk, to the Redstone Airstrip. This building is now being erected. The telescope will be suspended inside the structure for checkout. Marshall Center personnel will also be trained to operate the telescope and equipment at this facility.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 10, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-79

MARSHALL SPACE FLIGHT CENTER, AL -- A land-use survey of five North Alabama counties will be conducted by the NASA-Marshall Space Flight Center as part of its research program into application of remote sensing techniques.

Marshall Center researchers will photograph the area with remote sensing cameras from the air.

A specialized camera is now being flown, gathering preliminary data.

The counties include Madison, Marshall, Limestone, Jackson and DeKalb.

Officials directing the remote sensing demonstration project said the survey in this particular application will be made to study how the land is being used now. It is planned that the land-use survey results will be utilized by the Top of Alabama Regional Council of Governments (TARCOG). Representatives from city and county governments in the five county area being surveyed make up TARCOG.

-more-

The Marshall Center is also working with Alabama A&M University, Huntsville, for a "ground truth survey." This survey will supplement the aerial photography work. University personnel will make a sample ground study to correlate remote sensing information.

The demonstration is a part of the Marshall Center's Earth resources program. Dr. Eberhard Rees, MSFC director, recently appointed a task group to study a possible regional Earth resources survey program in a portion of the Southeastern United States and especially North Alabama and Southern Tennessee. Ludie Richard, deputy director of Science and Engineering, is chairman of the task team.

"Earth resources" activity is defined by NASA as relating to the gathering of data on the Earth from spacecraft or aircraft, including information on geological features, productivity, pollution and other conditions which can be assessed remotely.

Remote sensing research has been conducted by the space agency for several years. NASA has developed remote sensing techniques and equipment for use on both aircraft and Earth satellites.

Researchers here said the work will give Marshall Center personnel experience for future work with both manned and unmanned remote sensing satellites. An unmanned satellite, Earth Resources Technology Satellite (ERTS), is scheduled to be orbited in 1972 to perform a variety of remote sensing activities. An Earth Resources Experiment Package (EREP) will be used on the manned Skylab missions scheduled for 1973.

The instrument being used for the Marshall Center's initial work is a multi-spectral camera. Selective filtering of the camera's four lenses yield four images, each of which is limited to a different portion of the light spectrum.

An infrared channel is included. Such images permit evaluation of terrain features, vegetation, urban characteristics, water and other information. It is expected that detailed land-use data can be derived from the multi-spectral images.

Land-use maps showing current conditions may be made from the survey results. When these land-use maps have served MSFC's purposes they may be used by local organizations such as TARCOG as a tool in solving community problems. Such maps are of particular value as aids to optimum development of our agricultural, forestry, industrial, urban and recreational resources. TARCOG hopes that the land-use data will permit orderly planning for the best use of land for production.

Similar demonstration projects are now underway at other NASA installations including the Manned Spacecraft Center, Mississippi Test Facility, Wallops Station, Langley Research Center, Ames Research Center and Lewis Research Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 10, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121

Release No. 71-80

MARSHALL SPACE FLIGHT CENTER, AL -- The second flight model Lunar Roving Vehicle (LRV) will be delivered to the National Aeronautics and Space Administration May 12 by the Boeing Co., prime LRV contractor, and an LRV qualification test unit will be delivered to NASA's Marshall Space Flight Center today (May 10).

The flight model is scheduled to rove the Moon during the Apollo 16 mission in January 1972. The first flight LRV will go to the Moon on Apollo 15 in July 1971.

The qualification unit is a replica of flight LRVs. It will be at the Marshall Center through the Apollo 15 mission, when it will be used for possible trouble shooting while the first flight LRV is making three exploration traverses of the lunar surface.

The second flight LRV will remain at Boeing's Kent Space Center near Seattle until after Apollo 15. It will be joined in temporary storage by the third flight model, due for delivery to NASA in June.

The qualification unit will undergo several tests at MSFC before it is prepared for use during Apollo 15, when it will be deployed and checked as its counterpart transports two astronauts on the Moon.



Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 18, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-85

MARSHALL SPACE FLIGHT CENTER, AL -- Advancements in holography and optical filtering will be discussed at a two-day technical conference May 24-25 at the National Aeronautics and Space Administration's Marshall Space Flight Center. Twenty-five technical papers will be presented at sessions in Morris Auditorium.

The conference will review research in holography and optical filtering being conducted by various NASA centers as well as in industry and universities.

Holography is a technique of using lasers to obtain a three dimensional image of an object or scene without the use of camera or lenses. This optical method is employed in display systems and in certain types of testing.

-more-

An estimated 150 representatives of government, industry and universities are scheduled to participate in the national conference. This is the second such meeting and is being sponsored by NASA and the Huntsville Section of the Optical Society of America.

John R. Williams, MSFC Space Sciences Laboratory, is conference chairman.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 18, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-86

MARSHALL SPACE FLIGHT CENTER, AL -- National Aeronautics and Space Administration executives directing the Skylab Program are participating in a Skylab Senior Management Tour beginning today (May 18) at Martin Marietta Corp., Denver, CO.

Skylab executives will see work underway at Martin Marietta before moving on to visit West Coast contractors. The first stop on Wednesday will be at the North American Rockwell plant at Downey, CA. In the afternoon the group will tour McDonnell Douglas Astronautics Co. facilities at Huntington Beach, CA.

A second half of the Skylab tour is scheduled for May 25-26. Skylab executives will journey to McDonnell Douglas facilities in St. Louis, MO, for a morning visit. A visit to the Marshall Space Flight Center is planned for the afternoon. The group will go to the Kennedy Space Center, FL, on Wednesday, May 26.

A similar Skylab managers' tour was held last year.

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Executives taking part in all or a part of the tour include :

Charles W. Mathews, deputy associate administrator for Manned Space Flight, NASA Headquarters; William G. Schneider, director Skylab Program, NASA Headquarters; Dr. Eberhard Rees, MSFC director; Dr. William R. Lucas, MSFC deputy director, technical; Leland F. Belew, MSFC's Skylab Program manager;

Dr. Kurt H. Debus, KSC director; Miles Ross, KSC deputy director; Raymond L. Clark, KSC director of technical support; Christopher Kraft, Jr., Manned Spacecraft Center deputy director; Kenneth S. Kleinknecht, manager of Skylab Program at MSC; and Astronauts Alan L. Bean and Charles Conrad, MSC.

Also participating from industry are :

Walter F. Burke, president and chief operating officer of McDonnell Douglas Astronautics Co.; Dr. Ben G. Bromberg, vice president and general manager, and Raymond A. Pepping, vice president and general manager Skylab Program, both of MDAC Eastern Division; Fred J. Sanders, program manager, Skylab-Orbital Workshop, MDAC Western Division;

George Jeffs, vice president, Space Division, and Joseph P. McNamara, president, Space Division, both of North American Rockwell Corp.;

Caleb B. Hurtt, vice president, Manned Space Systems, Skylab Program, and William G. Purdy, vice president and general manager, both of Martin Marietta Corp.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

May 26, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-89

MARSHALL SPACE FLIGHT CENTER, AL -- The National Aeronautics and Space Administration today selected Global Associated, Oakland, CA and Service Technology Corp., Dallas, for further competitive negotiations leading to final selection for award of a contract to provide institutional support services at the Mississippi Test Facility, Bay St. Louis, MS. Eight firms submitted proposals for this work.

The scope of the proposed contract includes facility engineering, maintenance, and construction services; utilities operation and maintenance; medical, food, fire prevention, security, material, and custodial services. In addition, the company will maintain the rocket stage testing facilities in a standby status and support other federal agencies which may use the facility.

The cost-plus-award-fee contract will be for one year and will contain provisions for two additional one-year periods.

The contract will be directed by the Marshall Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, AL

June 1, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Curtis Hunt - residence - 205/852-1763

Release No. 71-91

MARSHALL SPACE FLIGHT CENTER, AL -- A recent rocket engine test firing at the NASA-Marshall Space Flight Center extended the "certified lifetime" of seals, O-rings and gaskets in all types of rocket engines and stages of Saturn IB and Saturn V vehicles.

The effect of this is to extend the storage lifetime of the 29 Saturn stages now in existence, from eight years to ten.

Nine S-IB (first) stages and seven S-IVB (second) stages of the Saturn IB, plus five S-IC (first) stages, five S-II (second) stages and three S-IVB (third) stages of the Saturn V are awaiting use. More than half are scheduled for use before the end of 1973, but some are presently uncommitted and are in indefinite storage.

Each S-IB has eight H-1 engines, each S-IVB has one J-2 engine, each S-IC has five F-1 engines and each S-II has five J-2 engines. All are made by Rocketdyne Division of North American Rockwell Corp.

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As part of a continuing test series, engineers at the Marshall Center took a single H-1 engine, number H-2033, from storage where it had been "hibernating" for almost nine years. The engine had been kept in its original configuration.

The test consisted of three starts of the engine and a full-duration run of 140 seconds. The engine performed as well as it did when it received its initial qualification test firing.

Engineers disassembled the engine and examined every part carefully. They found that all seals were still good and that the engine was entirely serviceable.

The test of engine H-2033 qualified all "software" -- seals, O-rings and gaskets -- on the engines on stored stages and extended the storage limitations from eight to ten years.

The next Saturn IB vehicle to be used is number 206 which will carry an Apollo spacecraft and crew of three astronauts into Earth orbit early in 1973 to rendezvous and dock with the Skylab.

The tests were conducted by the Test Division and examination of engine components by the Materials Division of the Marshall Center's Astronautics Laboratory. The Quality and Reliability Assurance Laboratory performed complete pre-test and post-test examinations of the engine.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 3, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-93

MARSHALL SPACE FLIGHT CENTER, Ala. -- A Skylab Workshop test unit will reach the NASA-Marshall Space Flight Center late today aboard the NASA barge "Orion." It comes from the NASA-Manned Spacecraft Center, Houston, Texas.

This is a ground test version of the Workshop which will be used in the Skylab program to accommodate teams of three astronauts for stays up to 56 days in Earth orbit. The Skylab will be launched by a Saturn V vehicle in 1973.

The Workshop, called a "dynamic test article," will be modified here for extensive static structural testing. It will be placed in the Marshall Center's huge dynamic test tower for this test series. A two-month test program is scheduled to start about Nov. 1.

Soon after arrival, the Workshop will be moved to the Product Engineering and Process Technology Laboratory. There it will be

-more-



outfitted with test instrumentation and a simulated meteoroid shield. Technicians will also do some minor rework on the inside of the stage.

The Workshop model is a Saturn S-IVB stage converted by McDonnell Douglas Astronautics Co., manufacturer of the flight hardware, for its ground test role. The structure was formerly the third (S-IVB) stage on the Saturn V facility vehicle used to check out assembly and ground test equipment at the NASA-Kennedy Space Center.

At MSC, the highly instrumented vehicle was placed in an acoustic chamber and subjected to sound waves which simulated the Saturn V launch acoustic environment. The Workshop model was then placed in a second chamber and connected to electromagnetic "shakers" which simulated elements of the launch environment such as vibration.

Tests at the Marshall Center will be conducted in the Astronautics Laboratory. Loads placed on the vehicle will simulate the forces which the main structural elements of the Workshop will encounter prior to launch and during launch and orbital flight.

The Marshall Center directs the Workshop development program. William K. Simmons is the manager of the Workshop project in the Skylab Program Office.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 8, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121}

Release No. 71-97

MARSHALL SPACE FLIGHT CENTER, Ala. -- The Rocketdyne Division of North American Rockwell Corp. has been granted a contract modification for continued support work on rocket engines for Saturn launch vehicles.

Approved by the NASA-Marshall Space Flight Center, the modification is valued at \$26,228,158. The contract period is from July 1, 1971, through Dec. 31, 1972.

Rocketdyne has built and delivered the F-1, J-2 and H-1 engines that power Saturn IB and V launch vehicles. This contract modification allows continued analysis of engine performance, field engineering, logistics, and retention of a Rocketdyne problem-solving group during the remainder of the Saturn program.

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The work support will be done at Rocketdyne's Canoga Park, Calif., plant, at the Marshall Center, the Michoud Assembly Facility, and the Kennedy Space Center, Fla.

The F-1 engine powers the Saturn V launch vehicle's first stage. The J-2 engine is used on the Saturn V's second and third stages, and the second stage of the Saturn IB. The H-1 engine powers the first stage of the Saturn IB, and was also used on the Saturn I vehicle's first stage.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 9, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-99

BAY ST. LOUIS, Miss. -- Six firms have made proposals to the NASA-Mississippi Test Facility relative to providing technical systems needed to develop and calibrate instruments which are to be used for marine and atmospheric research.

About 80 companies were invited to make proposals on the "design, procurement, fabrication, installation and checkout of technical systems for development and calibration of marine and atmospheric instrumentation."

Responses are now being evaluated from H. J. Ross Associates, Miami, Fla.; Sperry Systems Management Division, Syosett, N.Y.; Wyle Laboratories, Huntsville, Ala.; Holmes and Narver, Inc., Los Angeles; Cadre Corp., Atlanta; and Campbell Piping Contractors, Mobile, Ala.

The winner of the contract will install equipment in MTF's Central Instrumentation Facility, to be used to develop and/or calibrate

-more-

instruments that will measure temperatures, pressures, water salinity, conductivity and other properties. The instruments are to be used in data buoy, environmental and other such work assigned to MTF.

The MTF is a part of the NASA-Marshall Space Flight Center, Huntsville, Ala.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 14, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-103

MARSHALL SPACE FLIGHT CENTER, Ala. -- No major technology work remains to be done before the Space Shuttle main engine development phase begins, Jerry Thomson, a propulsion engineer at the NASA-Marshall Space Flight Center, told an American Institute of Aeronautics and Astronautics conference today at Salt Lake City, Utah.

Thomson was speaking at the AIAA/SAE Seventh Propulsion Joint Specialist Conference.

Thomson told propulsion experts from throughout the country that "Shuttle propulsion technology has been vigorously pursued in a totally organized approach for several years." He cited the work done by NASA, Department of Defense and industry.

Because of this foundation, he pointed out, "designs with strong technological bases are ready to proceed into the development phase."

With regard to the airbreathing engines that would return Shuttle stages to landing fields after completion of missions, "the technology

-more-

situation is in even better shape." The technology has been building over the past two decades, and "no major technology work remains to be done before the development phase begins," Thomson said. He pointed out, however, that if hydrogen propulsion is chosen for these airbreathing engines, some additional technology development will be necessary, adding about one year to the schedule.

The Marshall Center is to be responsible for developing the Shuttle's main engine system and the Shuttle booster stage.

He said development for the main engine is scheduled to begin this year and final flight certification is targeted for March 1978.

The Space Shuttle will be a two-stage, fully reusable vehicle designed to ferry large payloads into earth orbit. The vertically launched booster will place an orbiter stage into orbit and then land at an airport like a conventional aircraft.

Thomson said for the many modes of flight in the Shuttle there are three separate propulsion systems in the booster--main, attitude control and airbreathing--and four in the orbiter. The orbiter will have an additional system for orbital maneuvering.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 22, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-106

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration is planning to modify the former Saturn V second (S-II) stage test facilities at the NASA-Mississippi Test Facility for the space shuttle engine testing. The plans, announced March 1, are to convert two former S-II stands for testing the shuttle's orbiter and booster engines.

A contract for the final design of the required modifications to provide two operable engine test stands has been awarded to the architect-engineering firm of Sverdrup and Parcel and Associates, Inc., St. Louis, Mo. The total price of the design contract is \$447,000.

The modifications that will be required to convert the existing S-II stands for shuttle engine testing include the addition of liquid oxygen and liquid hydrogen run tanks, a thrust measuring system, and modifications to the stands' structural, mechanical and electrical systems. The Missouri architect-engineering firm will provide the engineering drawings and specifications that will be needed to accomplish the construction effort.

Engine testing is planned to start in the second quarter of calendar year 1973.



Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 24, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-108

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a contract to TRW, Inc. to study a space communications/navigation research laboratory.

Duration of the \$288,000 contract is 10 months.

Purpose of the study is to develop conceptual designs for a manned communications/navigation research laboratory capable of supporting a wide variety of experiments in the field of communications and navigation.

TRW will define experiments and experiment requirements, identify major laboratory and experiment equipment and develop conceptual designs of major equipment and instrumentation.

The study assumes the communications/navigation research laboratory would be developed for launch in the 1980's. The facility could be flown as a Research and Applications Module or be a segment of the orbiting space station. The space shuttle transportation system would deliver the facility to orbit and return it to Earth.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 23, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-109

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration today selected General Electric Co., Slidell, La., and RCA Service Co., Camden, N.J., for further competitive negotiations leading to award of a contract to provide technical support services at the Mississippi Test Facility, Bay St. Louis, Miss. Thirteen companies submitted proposals for this work.

The cost-plus-award-fee contract will be for one year and will contain provisions for two additional one-year periods.

The contractor will provide integration support services, data support services, central instrumentation services, and chemical/biological analysis services in support of other activities which may be using the MTF facilities.

The Mississippi Test Facility is under the direction of the NASA-Marshall Space Flight Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 24, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-110

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center announces the selection of Rocketdyne Division of North American Rockwell Corp. to develop turbopump assemblies for a hydrogen and oxygen space shuttle auxiliary propulsion system (APS) technology program.

Rocketdyne is being asked to develop the technology and supply shuttle APS turbopump assembly "breadboards" for the space agency's technology advancement program. A "breadboard" is a non-flight, working model used for repeated ground tests. There is no flight hardware called for in the contract.

Estimated total cost of the 16-month contract is \$1.1 million.

Rocketdyne is being asked to develop three major turbopump components. These include the turbine, gas generator, pump and required control valves. The six phase contract includes an exploratory study to select the best design; design of turbopump

-more-

components; fabricating a turbopump system; testing; refurbishing, performing acceptance testing and delivery to NASA; and supplying engineering support during NASA's "breadboard" technology program.

The proposed shuttle APS will have liquid hydrogen/liquid oxygen engines with a thrust of from 1,500 to 2,000 pounds. Both the shuttle orbiter and booster will use basically the same APS engine for attitude control. Common items in the engines include turbopumps, gas generators, heat exchangers, thrusters and related components.

The space shuttle is envisioned as a two-stage reusable vehicle that will ferry men, supplies and equipment into Earth orbit and return to Earth for refueling and reuse. The shuttle's main propulsion system is being studied under separate contracts managed by MSFC.

Three NASA centers are cooperating in the shuttle APS technology advancement program. The Manned Spacecraft Center has overall responsibility for APS technology development and among other major efforts is specifically responsible for APS thermal conditioner development. Lewis Research Center is directing technology work in the APS thruster area. Along with the turbopump assembly work and other efforts, MSFC is currently working on development of an APS fuel feed system to operate in zero gravity conditions.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 24, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-111

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has modified an existing contract with Martin Marietta Corp., Denver, Colo., for work on the Skylab Program.

The Martin contract includes work for systems engineering and integration, control and displays hardware and Multiple Docking Adapter (MDA) hardware. The MDA is a docking device for the Apollo spacecraft bringing crewmen to the Skylab cluster. Inside the MDA will be controls and displays for the Apollo Telescope Mount solar observatory and other experiments.

Under the contract change, Martin will incorporate the Earth Resources Experiment Package (EREP) into the flight version of the MDA. The EREP contains a number of photographic experiments which will allow scientists to study the Earth from orbit.

Total cost of the contract modification is \$6,070,500.

Skylab will be launched in early 1973 to study the capability of man and equipment to operate in space for long durations. The first mission of 28 days will be followed by two 56-day missions.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

June 29, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-112

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a contract to Brown Engineering Co., Huntsville, Ala., for developing a systems simulator for use in assessing life support and habitability requirements for future space applications.

The contract totals \$97,996. Delivery of the simulator is scheduled for Oct. 1.

The systems simulator will be a cylindrical chamber 48 feet long and having an inside diameter of 13-1/2 feet. The dimensions are comparable to those planned for the modular space station.

This chamber will eventually be used as a habitat with a completely closed environment such as that required by a crew in space. It will be capable of supporting a six man crew for periods of 30 days and longer.

About half of the 48 foot length will be used for environmental control and life support systems as well as various experiments

which will be similar to those envisioned with future manned space modules. The remaining half will be used for living space, including provisions for sleep, waste collection, hygiene, nutrition, study and recreation.

Brown will design and provide the chamber hardware, including two 24-foot long cylinders which will be assembled into a single long tube.

The structure will be located in Astronautics Laboratory, Building 4619.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

July 8, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-116

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a contract to North American Rockwell Corporation for an In-Space Propellant Logistics and Safety Study.

The 12-month study will cost \$325,000.

This is a two-part study. The major portion of the work will be an investigation of propellant logistics. A safety analysis of space propellant logistics and operations will comprise the second part.

NASA's overall space program options include many space operations. In-space refueling and resupply by the early to mid-1980's is considered to be a vital part in some of these options. During the 1975-1995 period of space exploitation, operations contemplated will include: the space shuttle system carrying personnel from earth to earth-orbit and return, cargo delivery, a space station or base, a space tug for operations in earth orbit, a lunar shuttle, a lunar orbit station, a lunar surface base and unmanned probes to Mars, Venus, and other planets.

-more-



North American Rockwell will investigate the major elements which may require fluid resupply for propulsive or life support needs. The firm will also analyze the current concepts of orbital propellant logistics to determine a best approach from a total performance and safety viewpoint of all systems and operations.

For the purposes of this study, propellants to be considered are hydrogen, oxygen, and slush hydrogen. Propellant containerization and transfer concepts considered shall include manned and unmanned logistics flights with the orbital transfer concepts being unmanned with the exception of any required maintenance and repair.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

July 9, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 852-8847)

Release No. 71-117

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration today selected Global Associates of Oakland, Calif., for award of a contract to provide institutional support services at the Mississippi Test Facility, Bay St. Louis, Miss. Global was selected following competitive negotiations for this work. Initially eight firms submitted proposals.

The contractor will provide facility engineering, maintenance and construction services; utilities operation and maintenance; medical, food, fire prevention, security, material, and custodial services. Additionally, the company will maintain the rocket stage testing facilities in a standby status and support other federal agencies which may use the MTF facilities.

Estimated cost of the one year contract is approximately \$4 million. The cost-plus-award-fee contract contains provisions for two additional one year periods.

The MTF is a part of the Marshall Space Flight Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

July 12, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Bart J. Slattery - residence - 881-4123)

Release No. 71-118

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has been chosen by the National Aeronautics and Space Administration Headquarters to take the integration role in managing two proposed Earth orbital projects now in the planning stage, the Space Station and the Research and Applications Modules (RAM). With this assignment, the Marshall Center will have the responsibility for supervising the definition, design and verification of design concepts.

This action follows a similar decision to assign the integration role in the Space Shuttle program to the NASA-Manned Spacecraft Center, Houston, Texas. The Marshall Center will be responsible for the Shuttle booster design and fabrication, and for the main engines for both the orbiter and the booster of the Shuttle.

Both assignments were made by Dale D. Myers, Associate Administrator for Manned Space Flight.

The Space Station has been under study for nearly two years. The present concept calls for a semi-permanent facility in earth orbit

-more-

which would be carried to orbit by the Space Shuttle. Development of the Space Station would follow the development of the Shuttle.

RAM, a newer concept, is a family of space payload carrier modules to be delivered to earth orbit by the Shuttle. RAMs will be capable of supporting diverse technological and scientific investigations and practical applications. Certain RAMs would remain attached to the Shuttle during short duration missions. Other RAMs would be released from the Shuttle in orbit and operate as free-flying unmanned automated spacecraft. These free-flying RAMs would be designed for long-term usage. They would be serviced and maintained in orbit during subsequent Space Shuttle missions. When the Space Station becomes available, some RAMs would operate directly attached to the Station. Others will operate in the free-flying mode and be supported by the Space Station.

In a letter to Dr. Eberhard Rees, MSFC Director, Myers said that an "Integration effort should be initiated now under the lead management of MSFC, with adequate and integrated support from the other centers. These efforts will serve to verify the concepts that are being defined in the RAM and Space Station studies," he said.

"This activity should mainly utilize those elements of subsystems that have been or are being developed in various advanced development programs to assemble breadboard units for gaining practical experience and confirmation of design and operational concepts. It is essential that this program be applicable to both the RAM and to the Space Station," Myers wrote.

He further called on Marshall "to take the lead in mustering the talents of MSF centers (Manned Spacecraft Center and Kennedy Space Center) to define and recommend a program to meet the above objectives including the management approach that should be utilized to best combine the necessary elements of this program."

In implementing this assignment, the Marshall Space Flight Center will utilize talent throughout the agency, especially from the Manned Spacecraft Center and the Kennedy Space Center.

"The management approach which was recently established for the Shuttle can serve as a model for this effort. For example, I would anticipate the need for appropriate project managers at the supporting centers and an integration group at MSFC staffed with co-located personnel from each of the Centers," Myers wrote.

Myers called attention to the present "major effort" which MSFC is directing to determine a preliminary design of the RAM. "This study is a very important effort because it will not only define the early sortie payloads for the Shuttle, but also because it will be one of the first detailed looks at Shuttle payload interface problems and operational requirements."

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Ala.

July 14, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-120

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a contract to North American Rockwell Corp., Space Division, Downey, Calif., for studying the feasibility of developing a low-cost, reusable chemical propulsion stage that could be launched from Earth on the Space Shuttle booster and then subsequently refueled in space for up to 10 space missions.

The 10-month "phase A" contract is for \$250,000.

This vehicle could be used for a high-lift capability to low Earth orbit, the placement of large payloads of the order of 100,000 pounds to geosynchronous orbit and eventually for lunar and unmanned planetary missions.

The Space Shuttle is to be a reusable vehicle which can deliver payloads into space far more economically than expendable rockets. It is, however, intended only for low Earth orbit operations and payloads of up to 65,000 pounds.

-more-

Engineers here are requiring that the interorbital stage have a lifetime of three years or 10 uses in space, whichever comes first. It would be designed so that maintenance can be carried out in Earth orbit and for quiescent state in orbit for periods of up to 180 days.

The interorbital stage would utilize many of the components and systems of the Space Shuttle; for example, it would burn liquid hydrogen and liquid oxygen and the engines would be the same as those to be used on the Space Shuttle.

The Marshall Center effort is being performed within the Program Development Directorate.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

July 16, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-122

MARSHALL SPACE FLIGHT CENTER, Ala. -- Lowell K. Zoller has been named manager of a task team formed to direct work on the Research and Applications Module (RAM) at the NASA-Marshall Space Flight Center.

Dr. Eberhard Rees, MSFC director, made the appointment.

The Marshall Center recently received responsibility for RAM definition, design and verification of design concepts. RAM is a proposed family of space payload carrier modules which would be delivered to Earth orbit by the Space Shuttle. RAMs will be capable of supporting diverse technological and scientific investigations and practical applications.

The major RAM work underway at the Marshall Center is the "Phase B" or definition study.

The RAM Task Team is an element of Program Development.

Zoller was formerly chief of the Program Control Group in the Program Planning Office of Program Development. A native of Fort Wayne, Ind., Zoller earned a degree in chemistry and physics in 1957 at Purdue University. He came to the Marshall Center in 1961.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

August 5, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-134

MARSHALL SPACE FLIGHT CENTER, Ala. -- RAM is a new term  
in space circles.

It stands for Research and Applications Modules and it refers to a set of proposed manned and man-tended craft which will be capable of supporting a great variety of scientific and technological investigations.

RAM will fit inside the cargo bay of the Space Shuttle, which is its launcher. In space the modules will operate either attached to the Shuttle or in some cases free-flying in the vicinity of the Shuttle. Later versions will operate in conjunction with a Space Station, either attached to it or free-flying from it.

The word "manned," of course, means the craft will be operated on a full-time basis by men. "Man-tended" means it is not normally manned but will be visited by men on occasion who will, in a shirt-sleeve environment, do maintenance or repair functions.

Specifically RAM does not include the unmanned automated spacecraft launched by the Shuttle and those which only require Shuttle

-more-

capture and return to Earth. RAM will require continuous or occasional occupancy by man in its operation.

The National Aeronautics and Space Administration, through its Marshall Space Flight Center, started looking into the concept of such a versatile spacecraft about two years ago. The need was to devise a payload unit which would in effect become parts of both the Space Station and the Space Shuttle, an economical means of extending the capability of both.

These modules, the first of which should be ready for initial flights of the Shuttle in 1978, would provide facilities for a wide range of investigations in such fields as astronomy, space physics, bio-science, biomedicine, Earth Surveys, materials sciences and processing, communications, navigation and advanced technology.

The fundamental themes of the RAM studies have been: maximum usefulness at low cost development, commonality of hardware and versatility. Wherever possible, NASA intends to use equipment that is already designed, avoiding major development costs.

The RAM concept calls for the crafts to be used interchangeably with the Station and the Shuttle. Since development has been deferred until after the Shuttle, the Station emphasis is being placed on units which would be Shuttle-supported.

Some of the RAM units would first be used in connection with the Shuttle and could later be supported by the Space Station.

By way of background, the "Phase A" feasibility study of the RAM concept got underway in June 1969 when the Marshall Center awarded a contract to General Dynamics Convair Division, San Diego, Calif. Later than same year NASA assigned Space Station studies to both McDonnell Douglas Astronautics Co. and North American Rockwell Corp. As a part of those studies, the two firms were to do preliminary study of experiment modules that would be supported by Space Stations. So, in effect there were three feasibility studies which followed the initial investigations of the concept at the Marshall Center.

Three aerospace teams, which numbered seven European firms among their members, submitted proposals to MSFC early this year for the next phase (B) of the work -- project definition and preliminary design. In May, General Dynamics was selected to perform Phase B RAM work -- preliminary design and definition. That work, also being supervised by the Marshall Center, is costing about \$2 million and requiring 15 months. It includes preliminary design, operational analyses, program planning and the development of mockups of critical portions of the RAM for engineering purposes.

Teamed with General Dynamics in this new phase of work are North American Rockwell Corp., TRW, Inc., and Bendix Corp. as major subcontractors. Indicating unusual foreign interest, five European firms are also participating in the study: ERNO of Germany,

SAAB of Sweden, Messerschmidt Boelkow-Blohm of Germany; Selenia of Italy, and MATRA of France.

The flexible RAM concept provides versatile and economical laboratory facilities for research and applications in many areas, and there are many potential users in government agencies, universities, industrial and commercial interest, both in this country and abroad. This concept is particularly attractive to small organizations and governments with limited resources, because it allows for a rather independent preparation of either a complete experiment module or a small experiment package that can be integrated into a RAM.

In some applications, for instance, the individual scientist could himself carry his experimental gear to the Shuttle, install it, fly into space with it, perform his research and upon landing, depart the airport with scientific gear and data in hand.

The RAM's are envisioned as 14 feet in diameter and up to 58 feet long, although they can be much shorter and there can be a combination of two modules to make up the maximum length. Including attach points to the Shuttle cargo bay, the outside dimension can be no greater than 15 feet by 60 feet. Maximum weight could be up to 32,000 pounds.

In the first studies, the RAM (then called the experiments module) was slanted toward use with the Space Station, attached or free-flying.

Now that the Space Shuttle is to be developed before the Space Station, RAM has been reoriented toward use in a Shuttle "sortie mode" in which the RAM would stay affixed to the Shuttle and would return to Earth after a stay of five to seven days in orbit.

NASA is now studying a family of RAM's that could be used with the Shuttle or Space Station, all constrained to shuttle cargo bay dimensions. RAM's to be used with the Space Station would be easily compatible with respect to dimensions, for current planning is that the Space Station would also be launched in sections in the same size cargo bay and then the individual cargoes would be brought together in space to form a modular station.

The types of RAM's under study are as follows:

1. RAM support module. This is the basic unit which houses the scientific and operational crew and experiment control equipment, power and data control equipment. Some experimental work will also be done in this module, so long as the apparatus is small and can function in a pressurized environment.

2. Pallet. This is simply a framework, a structure to which scientific equipment is attached, for exposed operation in the vacuum of space. The pallet would always be attached to another module -- normally the RAM support module -- where the scientific investigators would operate and live.

3. Pressurized general purpose laboratory. This is to house experiments which do not require vacuum, but do require manned

support, such as biology or biomedical work, or material research. This would normally be launched attached to a support module.

It is improbable that all three of these types would be launched together in one mission. Instead the support module would be used in conjunction with either the pallet or the general purpose, pressurized lab. (All three of these would operate attached to Shuttle, either in the cargo bay or pivoted out on "hinges" 90 degrees from the body of the Shuttle.)

4. Free-flying module. This is an automated, unmanned satellite which would be launched from the Shuttle cargo bay and serviced periodically by a RAM support module which remains attached to the Shuttle. (The docking equipment would be on the support module itself, not the Shuttle.) This free-flying module is the most sophisticated of all RAM concepts, having its own pointing control system, data handling and communications equipment, power supply, etc. A good example of this type would be a large astronomical observatory. Electrical power would probably be provided by solar arrays such as the Skylab uses. This would be the most difficult module to develop, but a good foundation for it exists in the Space Station studies done to date, and in the Skylab program. Once launched by the Shuttle, the free-flyer could operate for three or four months between maintenance revisits. It could be on orbit for a year or more, then

it would be recaptured by the Shuttle and returned to Earth for renovation or reoutfitting.

The pressurized general lab and the free-flying RAM closely approximate the experiment modules whose concept was investigated by the two Space Station contractors last year. Both of these units can be used in conjunction with the Space Station, as well as the Shuttle.

NASA plans for the Shuttle to be ready for use in 1978 or 1979. If RAM is to be ready by that time, actual development would need to get underway in 1974, following completion of preliminary design in 1972. It is necessary to push ahead with preliminary design at this time to assure compatibility with the Shuttle.

During the next few years before final design and fabrication of hardware, an extensive concept verification testing program will be carried out at the Marshall Center, using a number of mockups which are either available now within NASA or will be by the time the Phase B work is completed in 1972.

For example, during the Space Station studies, the two contractors produced mockups of two experiment modules. McDonnell Douglas, through a subcontract with Martin-Marietta, delivered to MSFC a mockup of an astronomical observatory featuring a three-meter telescope. North American Rockwell produced for the Manned

Spacecraft Center a general purpose laboratory mockup. Both of these units were designed to operate from a Space Station, but they can also operate from a Shuttle and therefore fit the RAM definition. Those mockups, plus others being built here and by General Dynamics, will be made available for the MSFC concept verification testing.

##



# RAM



MSFC-71-PD 4000-89A

NASA-MSFC

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

August 16, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-138

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center today notified employees of the details of the planned personnel reduction-in-force (RIF) which was announced last January.

Although Dr. Eberhard Rees, MSFC director, informed MSFC workers January 29 that the Marshall Center would have to reduce by 299 persons during Fiscal Year 1972, only 187 separation notices have been issued.

The lessened impact was made possible by voluntary resignations and retirements during the past eight months.

In addition to those being separated, 64 employees will be reassigned to other positions and 89 will be reduced in grade.

These figures include personnel actions at MSFC's Michoud Assembly Facility at New Orleans and West Coast offices.

Affected employees were notified today (August 16). Changes are to be effective no later than October 2.

Dr. Rees explained in his January letter, and in other communications in the interim, that budget restrictions for the 1972 fiscal year

-more-

(which began July 1, 1971), made the reductions necessary. Throughout the agency, 1,500 persons are being separated.

This step will bring Marshall's permanent personnel strength to 5,507 in fiscal year 1972.

Last week (August 11) Dr. Rees assured employees in a letter that the RIF would be carried out "strictly within the laws governing the Civil Service and the rules and regulations of the Civil Service Commission" and that every step would be taken to assist dislocated persons in finding new employment.

"Employees who receive RIF notices will be entitled to review the retention registers affecting them, and to counseling service by the Personnel Management Specialists as to their rights and procedures to be followed."

He said the retention registers would be available on the first floor of Building 4202. In the same location, he said, Marshall will "organize and operate an outplacement program to assist in securing new employment for our fellow workers who receive separation notices and those who are reduced by more than one grade."

Said the director in conclusion:

"Reductions-in-force are not only difficult but most unpleasant; not only for those whose jobs are affected but for those of us who must implement them. Everyone recognizes the possibility of his job being affected, but it does not make it any easier to accept when it happens.

I hope you realize with what regret we see competent, loyal employees leaving the service of NASA and Marshall under any circumstances, but especially in a compulsory reduction-in-force.

"All I can ask is your continued performance of duty and cooperation with your supervisors and Center management. I promise you who are affected that we will do everything possible to assist you through our outplacement activities to find new employment and to otherwise ease the impact of separation in any way we can."

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

August 30, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-145

MARSHALL SPACE FLIGHT CENTER, Ala. -- TRW Systems Group, Redondo Beach, Calif., and Grumman Aerospace Corp., Bethpage, L. I., New York, have submitted proposals for developing an automated High Energy Astronomy Observatory (HEAO) which will study high energy radiation from space.

Bids were received August 27 at the NASA-Marshall Space Flight Center.

The contract will be awarded early in 1972.

The single contract for two spacecrafts is expected to continue through launch and mission operations support after launch. Estimated duration is approximately seven years.

TRW and Grumman completed HEAO Phase B preliminary design studies in April.

Objective of the HEAO Program is to obtain high-quality, high-resolution data on cosmic-ray flux and gamma ray and x-ray sources.

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Thirteen scientific experiments are expected to be flown on the two spacecraft. These instruments will be procured by the government under separate contracts.

The first HEAO satellite is planned for launch in 1975 on a Titan III launch vehicle from the NASA-Kennedy Space Center, Fla. A second is scheduled for launch one year later.

Length of the spacecraft will be about 39 feet and the design weight is 21,600 pounds. The spacecraft will have a maximum diameter of 105 inches.

Two flight-worthy HEAO payloads will be delivered under the proposed contract.

Plans call for the first two HEAO spacecraft to be launched into 200-nautical mile circular orbits with lifetimes of at least one year.

Tasks called for will include: system engineering of the HEAO payload; design and develop two spacecraft; procure and integrate an Orbit Adjust Stage and Shroud; integrate experiments; design, develop and deliver one set of HEAO ground support equipment; and launch operations support. The winning contractor will also provide mission operations support for the observatory for up to two years for each mission.

Mission engineering and integration work will include integrating the HEAO spacecraft to the Titan launch vehicle, integrating the total

space vehicle to launch facility and mission design and configuration management support.

The HEAO program is directed by the NASA Office of Space Science and Applications. Project management responsibility has been assigned to the Marshall Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

August 31, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-146

MARSHALL SPACE FLIGHT CENTER, Ala. -- Post manufacturing checkout of the Skylab's Apollo Telescope Mount (ATM) prototype is nearing completion at the NASA-Marshall Space Flight Center.

Following checkout, the ATM prototype will be prepared for shipment to the NASA-Manned Spacecraft Center in Houston for extensive thermal vacuum chamber testing.

The ATM unit is scheduled to be flown to Houston September 8 aboard the Super Guppy aircraft.

Important test program milestones were recently completed at the Marshall Center's checkout station in Quality and Reliability Assurance Laboratory. An "all systems" test was completed last week and a "plugs-out" test was finished Sunday, August 29.

At the Manned Spacecraft Center, the 22,000 pound ATM will be subjected to simulated space conditions in a large chamber used for testing the Apollo spacecraft. A Marshall Center checkout team will conduct the vacuum chamber tests in cooperation with MSC personnel who normally operate the chamber facility.

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The tests are expected to run through early December. The ATM prototype is scheduled to be returned to MSFC in mid-December for refurbishment.

The ATM is being fabricated at the Marshall Center for the Skylab program. The flight ATM will soon follow the prototype in the checkout position.

The ATM is a solar observatory which will operate from Earth orbit to give scientists views of the sun undistorted by the earth's atmosphere. Measurements in the extreme ultraviolet and x-ray portions of the electromagnetic spectrum will be taken.

The ATM will fly as a part of the Skylab cluster scheduled for launch in early 1973.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

August 31, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-148

MARSHALL SPACE FLIGHT CENTER, Ala. -- A temporary NASA-Marshall Space Flight Center group set up to handle the planning for the High Energy Astronomy Observatory (HEAO) project has been moved from the Project Development directorate and established in the Program Management directorate.

The HEAO Task Team has become the HEAO Office. Dr. F. A. Speer, who has been manager of the task team since April 21, 1971, continues as manager.

HEAO is a new project assigned to Marshall by the NASA Office of Space Science and Applications. The establishment of the office to manage the work was announced yesterday by Dr. Eberhard Rees, MSFC director.

Dr. Speer will have two deputies: H. J. Fichtner, transferring from the Science and Engineering directorate, deputy manager, technical; and J. C. Hughes, Program Management, deputy manager, management. Both deputies will have additional duties, Fichtner as chief of the Engineering Integration Office and Hughes as chief of the Planning and Control Office.

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The HEAO, the first of which is to be launched in 1975, will study high energy radiation in earth orbit.

The new HEAO office will manage all aspects of the development, launch and operation of HEAO. The office will draw upon the support of all Center elements, and particularly Program Development in connection with the planning for additional HEAO-type satellites beyond the two presently in the program.

Other assignments in the new office include:

J. M. Rieves is assistant to the manager.

J. H. Robinson is chief of Product Assurance Office.

C. H. Webb is manager of Launch Vehicle Office.

C. C. Dailey is manager of Experiments Office.

C. H. Meyers is manager of Spacecraft Office.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

September 7, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-150

MARSHALL SPACE FLIGHT CENTER, Ala. -- The Lunar Roving Vehicle (LRV) qualification unit is being shipped from the NASA-Marshall Space Flight Center to the NASA-Goddard Space Flight Center, Greenbelt, Md., this week for a series of magnetic properties tests in connection with the launch of Apollo 16.

The magnetic properties tests will be made at the GSFC magnetic test site, a special facility, from September 9 to 17 in support of a project now being studied by the NASA-Manned Spacecraft Center, Houston.

Scientists are planning to have a portable magnetometer as part of the Apollo 16 scientific equipment. The instrument will be in addition to the magnetometer that is in the Apollo Lunar Surface Experiments Package (ALSEP) included in every Apollo lunar exploration mission.

The tests at Goddard are designed to determine the contour of the magnetic fields of both the LRV and its auxiliary equipment so that the portable magnetometer can be placed out of contact with these fields.

After two days of public display at GSFC September 20-21, the qualification unit will be returned to the Marshall Center.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

September 13, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-152

MARSHALL SPACE FLIGHT CENTER, Ala. -- The booster stage for Saturn V launch vehicle SA-511 was shipped by barge from the NASA-Michoud Assembly Facility at New Orleans this morning. It is due to arrive at the NASA-Kennedy Space Center, Fla., late Friday, Sept. 17.

The stage, numbered S-IC-511, is the booster for the Saturn V vehicle that will launch Apollo 16 toward the Moon in March 1972.

The second (S-II) and third (S-IVB) stages of the 36-story launch vehicle are already at KSC, where they have been in storage awaiting the arrival of the other two stages.

The instrument unit for the Saturn 511 vehicle is scheduled to be flown from Huntsville to the Kennedy center Sept. 28. Stacking of the entire vehicle should begin Sept. 22 with erection of the S-IC-511 in KSC's Vehicle Assembly Building.

The S-IC booster stage will travel by barge through the Gulf of Mexico and around the tip of Florida to arrive at KSC's docking facilities. The instrument unit will be flown by a special Guppy aircraft.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

September 14, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035

(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-153

MARSHALL SPACE FLIGHT CENTER, Ala. -- Results of the highly successful Stratoscope II flight are being evaluated and engineers are assessing landing damage to the large astronomical telescope today at the NASA-Marshall Space Flight Center.

Film taken from the astronomical instrument soon after landing on Friday (September 10) is being processed this week at the Marshall Center.

Marshall Center engineers and scientists, who operated the telescope during the night-long flight, report that the telescope operated as expected.

The Stratoscope II instrument was returned to the Marshall Center Sunday from the recovery point some 60 miles northeast of Little Rock, Ark. The telescope came down on a farm about seven miles southeast of Bald Knob, Ark.

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A preliminary assessment of the telescope damage has been made by MSFC project engineers. David Gardiner, Stratoscope II project manager, said the telescope suffered extensive structural damage in the landing, but is repairable.

The telescope impacted in a tree top causing the instrument to break into two parts. The telescope's main tube and side arm fell some 40 feet to the ground.

Damage to the telescope's optical components is considered minor except to the 36-inch primary mirror which was chipped on its edges. Project officials said the primary mirror will probably be servicable after grinding and polishing. However, an extensive evaluation of the instrument's optics must be made before full extent of damage is known.

Preliminary findings also show that the instrument's electronics and electrical components suffered minor damage.

The 36-inch astronomical telescope, suspended beneath two balloons, was launched at 7:33 p.m. Thursday (September 9) from the Redstone Arsenal Airfield. It reached its operating altitude at 82,800 feet just before 9 p.m.

The Stratoscope instrument drifted westward at 20-25 miles an hour, controlled from a Marshall Center station on Green Mountain, a high ridge near Huntsville. It was tracked by the Green Mountain station, a ground recovery team and a light aircraft.

The recovery team members were from the Marshall Center and the National Center for Atmospheric Research (NCAR). NCAR personnel launched the balloon and directed the recovery team to the landing site.

Dr. Robert Danielson, a Princeton University astronomer, directed the telescope operation during the flight. Dr. Danielson said the scientific mission was a success. Three primary scientific targets were photographed by the telescope; Galaxy M31 (commonly known as Andromeda), Galaxy M32, and Planetary Nebula NGC 7662. Scientific observations ended with sunrise at 6:02 a. m. CDT Friday over eastern Arkansas.

Dr. Danielson and his associates are developing the film and evaluating the scientific results.

Present plans call for the Stratoscope II instrument to be refurbished at the Marshall Center. It is expected to be flown again in about 14 months.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

September 22, 1971

IMMEDIATE RELEASE  
(Also released in  
Washington, D. C.)

Release No. 71-162

*001-111-111*  
MARSHALL SPACE FLIGHT CENTER, Ala. -- The Skylab payload shroud or nosecone will be delivered to the National Aeronautics and Space Administration Friday by the McDonnell Douglas Astronautics Co., Huntington Beach, Calif.

McDonnell Douglas manufactured the nosecone at its Huntington Beach facility. This is the first major piece of Skylab flight hardware to be delivered.

Space agency and McDonnell Douglas representatives conducted a formal review of the Skylab payload shroud Sept. 14 at Huntington Beach. At this review, the manufacturer presented a discussion of the flight hardware test program and the acceptance testing work remaining before formal delivery of the hardware on Sept. 24.

Space agency representatives were from NASA Headquarters, the Marshall Space Flight Center and the Kennedy Space Center.

The Skylab payload shroud is 60 feet long, 22 feet in diameter at its base and weighs some 26,000 pounds. It tops the Saturn V launch

-more-

vehicle which places the Saturn Workshop in Earth orbit. The Skylab launch is scheduled for early 1973.

The Skylab nosecone will be stored at Huntington Beach until mid-1972, when it will be shipped to the Kennedy Space Center for mating with other Skylab elements.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

For Release:

Sunday, Sept. 26, 1971

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-164

MARSHALL SPACE FLIGHT CENTER, Ala. -- The Apollo 15 astronauts who visit the NASA-Marshall Space Flight Center on Thursday (Sept. 30) will appear before groups of assembled employees at five locations and will dine with several hundred workers at a special luncheon.

The purpose of the six-hour visit of the three spacemen is to thank Marshall Center employees for the excellent work they have done in the Apollo program. MSFC was responsible for both the Saturn V rocket and the Lunar Roving Vehicle used by the Apollo 15 crew.

David R. Scott, spacecraft commander; James B. Irwin, lunar module pilot; and Alfred M. Worden, Jr., command module pilot, will speak to all employees by closed circuit television from Morris Auditorium at 9:15 a.m. They will be introduced by Dr. Eberhard F. M. Rees, MSFC director, who will have led a group of MSFC and Army officials in a welcoming ceremony earlier at the Redstone Army Airfield.

The audience of 400 in the auditorium will consist mostly of employees who have been recognized in the past for outstanding performance, work

-more-

improvement or cost reduction suggestions, or some other mark of superior achievement.

The astronauts are expected to each give firsthand accounts of their 12-day mission to the moon, using mission photography. They will discuss the performance of the Lunar Roving Vehicle, which allowed them to cover far more lunar terrain than all other Apollo moon-landing crews combined and was a major factor in the success of the flight.

At the conclusion of their presentations, Dr. Rees will present mementoes of their visit to Marshall, and the crew will greet employees gathered in front of the MSFC Headquarters building.

Another group of employees will be assembled at Building 4707, where the crew will make brief informal remarks beginning at 11 o'clock. Providing music for that gathering and the earlier auditorium ceremony will be Redstone Arsenal's 55th Army Band.

At 11:45 several hundred Marshall workers will have lunch with the astronauts in the ballroom of the Redstone Officers Club. Special luncheon guests will be several city and county officials, including Joe Davis, Huntsville mayor; Jimmy Record, chairman of the Madison County Commission; and Harry Rhett, chairman of the MSFC Community Advisory Committee.

Employees in still another area of the center will hear remarks from the astronauts beginning at 1:30 p.m. at Building 4619. Providing music

for that occasion will be the band of Grissom High School, the Huntsville high school named for the late astronaut Virgil I. Grissom.

On display at this stop will be a flight-type Lunar Roving Vehicle, identical to the one the crew used on the moon.

Preparations are made to move the outside ceremonies at Buildings 4707 and 4619 indoors in case of rain.

The final appearance will be in Building 4201 where the astronauts will give out a number of "Snoopy" awards, the astronauts' own personal citations to civil service and aerospace contractor workers who have made outstanding contributions to the success of manned space flight.

Accompanying the trio in their drives about the Marshall Center will be representative employees who have been singled out for exceptional accomplishments.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 8, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/433-4958)

Release No. 71-173

MARSHALL SPACE FLIGHT CENTER, Ala. -- A Skylab review of the Airlock trainer is being conducted by space agency and industry engineers today at the NASA-Marshall Space Flight Center.

The Airlock is one of the main components of the Skylab cluster planned for launch in 1973. It will be the connecting link between the Workshop and the Multiple Docking Adapter. The module is 16 feet, eight inches long and contains much of the Skylab's environmental control system, instrumentation and communication systems, caution and warning system, and electrical power distribution system.

Members of the review board represent the Manned Spacecraft Center, Kennedy Space Center, Marshall Center and McDonnell Douglas Astronautics Co.

Review board members are discussing results of a recent crew compartment stowage review of the Airlock trainer. The board will decide what findings merit further study and determine what action will be taken.

The Marshall Center manages the development of the Skylab hardware.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 12, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-174

MARSHALL SPACE FLIGHT CENTER, Ala. -- A study contract for continued system definition of a Reusable Nuclear Stage (RNS) has been awarded to the McDonnell Douglas Astronautics Co., Huntington Beach, Calif., by the NASA-Marshall Space Flight Center.

The study is part of a larger flight system program that has been underway for several years. The study continuation, valued at \$350,000, began October 1 and will last about 14 months.

The Reusable Nuclear Stage could be used for multi-purpose space missions. Previous studies have determined that it could be initially launched by either a Saturn launch vehicle or a Space Shuttle booster.

The new study will focus on RNS concepts that would be launched by the Space Shuttle, but it will consider both the two-stage, fully reusable Shuttle and the Shuttle booster with an expendable second stage.

The possibilities of launching the RNS as one complete unit, or launching components that would be assembled in space, will also be studied.

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Another part of the study will provide program support for the Nuclear Engine for Rocket Vehicle Application (NERVA), a program that has been under development for several years by NASA and the Atomic Energy Commission. This part of the contract will involve engine stage interface definitions, tradeoff studies, and the application benefits of advanced technology.

Three aerospace companies responded to the Marshall Center's requests for bids on the RNS study: McDonnell Douglas; GENII Industries of West Covina, Calif.; and North American Rockwell Corp. of Seal Beach, Calif.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 13, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Charles Kurtz - Fayetteville - 615/444-4958)

Release No. 71-176

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has awarded a contract to American Science and Engineering, Inc., Cambridge, Mass., for support services in the Skylab Apollo Telescope Mount project.

American Science and Engineering builds an x-ray spectrographic telescope (S-054) for the Apollo Telescope Mount (ATM).

The flight instrument has been delivered to the Marshall Center and is presently being installed on the flight ATM.

This contract calls for the Cambridge firm to provide engineering and testing support services relative to the experiment from Aug. 22, 1971, through June 30, 1972. The incentive-type contract totals \$1,197,000.

Skylab is an embryonic space station scheduled to be launched by the National Aeronautics and Space Administration in 1973. One of the major elements of Skylab is the ATM solar observatory.

The ATM will have high resolution solar astronomy experiments which will allow scientists to observe the sun from outside the Earth's atmosphere.

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NASA-MSFC

Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 13, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Curtis Hunt - residence - 205/852-1763)

Release No. 71-177

MARSHALL SPACE FLIGHT CENTER, Ala. -- Nine eminent visiting scientists join others at the NASA-Marshall Space Flight Center today for an all-day discussion of the "present NASA program of planetary and interplanetary probes."

One of the visiting group is Dr. Hannes Alfven, Nobel Prize-winning physicist originally from Sweden, who announced recently that the Earth and Moon are linked with a "quasimoon" only about one mile in diameter.

Known as the father of plasma physics, Dr. Alfven said the object, named Toro, "is part of the matter of this region. It belongs to the Earth-Moon system because it is gravitationally coupled."

The group meeting is known as the Comet and Asteroid Mission Advisory Panel. Dr. Ernst Stuhlinger, associate director for science, Marshall Center, is chairman of the panel.

Visiting scientists include: Dr. Bruce R. Doe of the U. S. Geological Survey, Denver; Dr. Stephen F. Dwornick of the Office of

-more-

Space Science and Applications, NASA Headquarters; Dr. Roger D. Bourke of Jet Propulsion Laboratory; Dr. Alan Friedlander of the Illinois Institute of Technology;

Dr. Fred L. Whipple of the Smithsonian Institution; Dr. Alfven of the University of California; Dr. Thomas Gehrels of the University of Arizona; Dr. David W. Strangway of the NASA-Manned Spacecraft Center; and Dr. Gustaf Arrhenius of the University of California.

Charles Guttman of the Advanced Systems Analysis Office, MSFC, is sponsor for the event.

The meeting begins at 8:15 a.m. and runs through 5 p.m. Subjects to be discussed and the principle speakers are:

"Scientific Objectives of Comet and Asteroid Missions," Dr. Alfven; "Selection of Objectives," Dr. Whipple; "Experiments and Instrumentation," Dr. Gehrels; "Flight Mission Characteristics," Dr. Bourke; "Flight Maneuvers Near Target," Dr. Friedlander; "Comet and Asteroid Science Study Contract," Dr. Arrhenius; and concluding remarks and plans for the next panel meeting, Dr. Stuhlinger.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 15, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Joe Jones - residence - 205/852-8847)

Release No. 71-178

MARSHALL SPACE FLIGHT CENTER, Ala. -- The NASA-Marshall Space Flight Center has been assigned the lead responsibility for the National Aeronautics and Space Administration's Space Tug activities.

*Copy* Dr. Eberhard Rees, MSFC director, announced last week he had received a letter from Dale Myers, head of NASA's Office of Manned Space Flight, assigning this new role to Marshall.

"The Space Tug is vitally important to the NASA concept of the total Space Transportation System, and offers great potential for use in conjunction with the Shuttle," Dr. Rees said.

The Space Tug would operate in Earth orbit, transferring payloads between orbits of varying altitudes and planes, and performing other transportation functions.

Presently the tug is in a very early study phase (pre-Phase A). NASA, the Department of Defense and the European Launcher Development Organization (ELDO) have each conducted studies, resulting in a number of different concepts and projected performance capabilities.

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Marshall will take the lead in NASA "in-house and contracted activities" as well as in providing liaison with the Defense Department and the European group which is interested in participating in the development and use of the vehicle, Dr. Rees said.

"In this role we intend to press forward with additional in-house studies to assure that in the near future the Tug concept is sufficiently well defined to support realistic Shuttle and payload planning."

Marshall was assigned the lead or integrating role in two other Earth orbital projects in July -- the Space Station and the Research and Applications Module (RAM) project. All three of these, along with the Space Shuttle, are elements of an integrated space program planned for the U. S. during this decade and the next.

Regarding the Tug assignment, Dr. Rees announced that a small Space Tug Project Group will be established within the Advanced Systems Analysis Office of Program Development. Bill Huber will head the Tug office in addition to his duties as director of the Advanced Systems Office.

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Public Affairs Office  
George C. Marshall Space Flight Center  
National Aeronautics and Space Administration  
Marshall Space Flight Center, Alabama

October 20, 1971

IMMEDIATE RELEASE

Phone: 205/453-0034, 453-0035  
(Maurice Parker - residence - 205/859-0121)

Release No. 71-183

MARSHALL SPACE FLIGHT CENTER, Ala. -- The booster stage for the first manned Skylab launch vehicle came out of a three-year hibernation yesterday at the NASA-Michoud Assembly Facility at New Orleans.

The Saturn IB vehicle stage, numbered S-IB-206, now begins a 10-month refurbishment program that will prepare it to boost the first three Skylab Program astronauts on their way to dock with the Saturn Workshop in Earth orbit. That launch date is scheduled for the spring of 1973.

The Saturn IB booster was placed in an environmentally controlled enclosure at Michoud in December 1968. It is one of nine IB stages stored there and at the NASA-Marshall Space Flight Center, parent center of the Michoud facility. There have been no flights of Saturn IB vehicles since the Apollo 7 mission in October 1968.

The S-IB-206 stage will be thoroughly inspected, modified and refurbished during the next ten months. Some engineering changes will be made to the stage, and certain components that have exceeded age or operational limits will be replaced. A complete functional

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checkout will follow the refurbishment, and the stage will be shipped to the NASA-Kennedy Space Center, Fla., in August 1972.

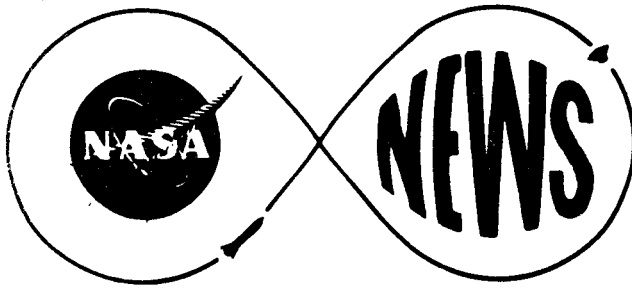
The second (S-IVB) stage of the SA-206 vehicle was shipped to KSC early this year, where it is now in temporary storage.

The instrument unit (IU) for the vehicle is now in checkout at the manufacturing plant of International Business Machines, Inc., in Huntsville. The IU will be flown to KSC in August 1972.

The SA-206 vehicle will be launched from a special pedestal on Pad B at KSC's Launch Complex 39.

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**NATIONAL AERONAUTICS AND  
SPACE ADMINISTRATION**  
Marshall Space Flight Center,  
Ala. 35812

Joe Jones, 205/453-0034  
(Residence - 205/852-8847)

**FOR RELEASE:**

PM's, Oct. 29, 1971  
Release No. 71-192

**MSFC EMPLOYEES HONORED IN WASHINGTON**

MARSHALL SPACE FLIGHT CENTER, Ala. -- Eight NASA-Marshall Space Flight Center employees, plus one who recently retired, are being presented medals in the National Aeronautics and Space Administration's annual awards ceremony today in Washington.

In addition, the widow of an employee who died last year is receiving a medal for her husband's accomplishments.

Three MSFC officials are receiving NASA's honor for scientific contributions, the Exceptional Scientific Achievement Medal. They are Sherman Seltzer (701 Corlett Dr., Huntsville) of the Astrionics Laboratory; Hans F. Wuenschel (2004 Dogwood Lane, Huntsville) of the Product Engineering and Process Technology Laboratory; and Clyde D. Baker (2507 "H" Toll Gate Rd., Huntsville) of the Aero-Astroynamics Laboratory.

The other seven awards are Exceptional Service Medals. The one being awarded posthumously goes to Mrs. Richard Davis, 5714 Jones Valley Road, whose husband, the engineering manager for the Lunar Roving Vehicle project in the Science and Engineering Directorate, died last October.

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Oct. 28, 1971

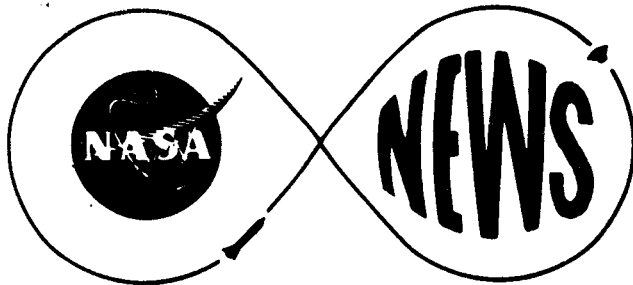


Harold Katz of Guntersville, former deputy director of the Management Services Office who retired earlier this year, is also receiving an Exceptional Service Medal.

Other recipients of Exceptional Service Medals are Josef Boehm (1311 Hermitage Ave., Huntsville) of Astrionics; Werner K. Dahm (7605 Martha Dr., Huntsville) of Aero-Astroynamics; John Gould (116 Teakwood Dr. S.W., Huntsville) of Astrionics; R. Scott Hamner (5017 NASA Rd. 1, Seabrook, Texas) of Mission Operations' office at the Manned Spacecraft Center, Houston; and James C. Taylor (4217 Choctaw Dr., Huntsville) of Astrionics.

The presentations were to be made in a ceremony presided over by NASA Administrator James C. Fletcher at NASA Headquarters at 1:30 p.m. CDT.

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Marshall Space Flight Center,  
Ala. 35812

Curtis Hunt, 205/453-0034  
(Residence, 205/852-1763)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-204

## MSFC RAISES \$192,509 IN CFC

MARSHALL SPACE FLIGHT CENTER, Ala. -- Employees of the NASA-Marshall Space Flight Center finished their Combined Federal Campaign this week with a remarkable showing, according to James W. Wiggins, executive chairman of the joint drive to finance health, charity and welfare organizations.

When the campaign ended, 96 per cent of the employees had either given or authorized payroll deductions to CFC totaling \$192,509.23. This was \$22,527.29 more than was raised in the 1971 campaign.

"Center management is deeply appreciative," Wiggins said, "of the fine showing by MSFC workers. Although there are fewer employees this year than last, they came through with more funds than ever -- in spite of the recent reduction in force.

"This shows that the people at Marshall have concern for those less fortunate."

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November 9, 1971

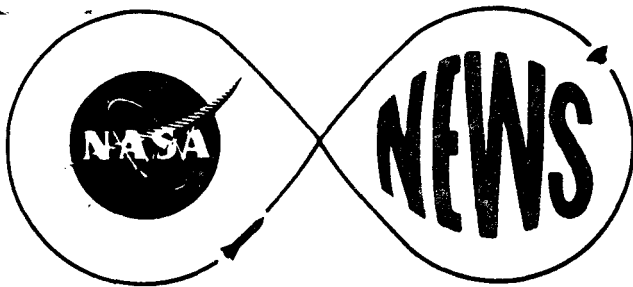
Wiggins extended his thanks to all who joined in the campaign to make it a success, and he gave special thanks to the solicitors for their efforts in contacting every employee.

The average gift this year was \$37.83 or \$5.97 more than last year.

Participation figures were: Center Director, 99 per cent; Administration and Technical Services, 95 per cent; Program Development, 99 per cent; Science and Engineering, 95 per cent; Program Management, 98 per cent; and other NASA organizations, 100 per cent.

Five of the six staff offices under the director, six of ten in A&TS, nine of the 12 in PM, four of the 12 in S&E, and seven of the eight in PD had 100 per cent participation.

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Maurice Parker, 205/453-0034  
(Residence, 615/859-0121)

**NATIONAL AERONAUTICS AND  
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Ala. 35812

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-211

## LRV-2 READY FOR APOLLO 16

MARSHALL SPACE FLIGHT CENTER, Ala. -- The second flight model Lunar Roving Vehicle (LRV) is now installed aboard the Apollo 16 Lunar Module in preparation for the next lunar mission in March 1972.

The LRV will transport Astronauts John Young and Charles Duke on three exploration sorties of the Moon's Descartes area during the Apollo 16 mission, scheduled for launch March 17. The LRV is managed by the NASA-Marshall Space Flight Center and was built by the Boeing Co.

The vehicle was closed up within the lunar lander Tuesday, November 16 at the NASA-Kennedy Space Center. The lunar module with LRV aboard will be moved to the Vehicle Assembly Building for mating with the Saturn V launch vehicle and the Apollo Command and Service Modules in early December. Vehicle rollout to the launch site is scheduled for December 13.

November 17, 1971

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An installation review of the LRV, headed by Rocco A. Petrone, Apollo program director, was held Friday, November 12, at KSC. Final approval of the LRV's flight readiness was given at the meeting.

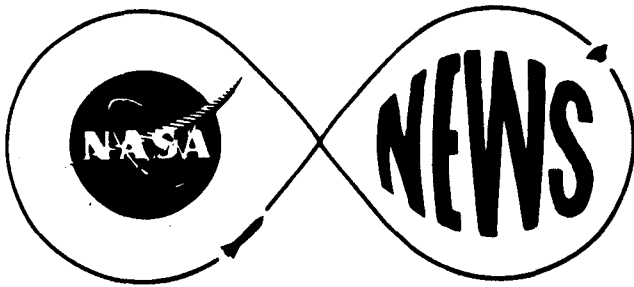
James M. Sisson, LRV project manager in the Marshall Center's Saturn Program Office, participated in the meeting.

The second flight LRV (called LRV-2) is now installed in a triangular storage bay of the Lunar Module's descent stage. The forward and aft sections of the LRV's chassis are folded over the center section. The vehicle's four wheels are folded inward, fitting the entire vehicle into an area 1.7 meters (66 inches) wide, 1.2 meters (48.5 inches) deep, and 1.5 meters (59.5 inches) high. The LRV is held in the Lunar Module at three attachment points.

Because of the successful performance of the first LRV, during the Apollo 15 mission in August, no major changes have been made to LRV-2. A slight problem with front steering that occurred during the first traverse of LRV-1 is not expected to reoccur, but the two front-wheel steering motors have been replaced with spare motors as a precaution.

New seatbelts for the two crewmen have also been installed, with a simpler design than those used on the first LRV.

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Marshall Space Flight Center,  
Ala. 35812

Charles Kurtz, 205/453-0034  
(Residence, 615/433-4958)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-212

## SKYLAB FLIGHT HARDWARE NEARING COMPLETION

MARSHALL SPACE FLIGHT CENTER, Ala. -- Skylab flight hardware manufacturing is nearing completion. Post-manufacturing checkout will begin soon at industrial and government installations across the country.

Skylab is this country's embryonic space station scheduled for launch early in 1973. A two-stage Saturn V launch vehicle will place the Skylab into Earth orbit. The first of three teams of astronauts will be launched in an Apollo spacecraft boosted by a Saturn IB rocket one day later. The astronauts, after docking with and entering the Skylab, will perform scientific experiments in the orbiting Skylab for 28 days before return to Earth. The two other teams will visit Skylab. Each is expected to remain for 56 days.

Major Skylab elements include the Workshop, Apollo Telescope Mount solar observatory (ATM), Airlock Module (AM) and Multiple Docking Adapter (MDA).

-more-

November 17, 1971

Workshop fabrication has been completed at the McDonnell Douglas Astronautics Co. facility at Huntington Beach, Calif. Post manufacturing checkout started on Saturday, November 6, and will extend through a complete systems checkout ending in March 1972.

Final assembly of the flight ATM is expected to begin in the next few weeks at the NASA-Marshall Space Flight Center. The Marshall Center directs the overall Skylab hardware development program and is assembling the ATM in its Product Engineering and Process Technology Laboratory.

The ATM solar experiment flight units have been mounted on the ATM frame. An experiment canister and structural rack are being completed before final assembly begins early next month.

ATM post manufacturing checkout is expected to begin in the early part of January at a checkout facility in MSFC's Quality and Reliability Assurance Laboratory.

Solar panel arrays for the ATM power generation and distribution system are also being fabricated at the Marshall Center. This task should be completed later in November and checkout is expected to begin shortly thereafter.

The Skylab's Airlock Module is being manufactured by McDonnell Douglas Astronautics Co. at its St. Louis, Mo., facility. An AM systems validation test is scheduled to begin November 12 at the St. Louis plant. This is the first major test in a series leading to the final acceptance of the flight unit.

The flight Multiple Docking Adapter is nearing completion at the Martin Marietta Corp. facility in Denver, Colo. MDA checkout will begin in the next few days. Following checkout at Denver, the MDA will then be shipped to St. Louis in December for mating with the flight AM.

The workshop is the living and principal working area for the three men.

The MDA permits connecting the Apollo spacecraft to Skylab. It also houses the operating and control area for one of the most important experiments aboard, the ATM solar observatory.

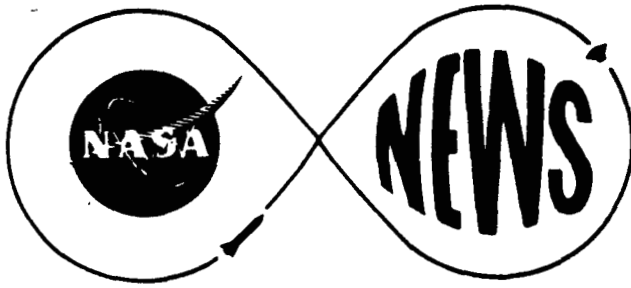
The ATM is an array of five solar telescopes which will permit investigation of solar phenomena heretofore impossible from earth or orbiting satellites.

The AM provides access between the MDA and the workshop.

In all more than 50 experiments will be carried aboard Skylab.

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SPACE ADMINISTRATION**  
Marshall Space Flight Center,  
Ala. 35812

Maurice Parker, 205/453-0034  
{Residence, 205/859-0121}

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-217

## RAM REVIEW SET DECEMBER 1

MARSHALL SPACE FLIGHT CENTER, Ala. -- A quarterly review of the Research and Applications Modules (RAM) study, now being conducted by the Convair Aerospace Division of the General Dynamics Corp., will be held at the NASA-Marshall Space Flight Center Wednesday, December 1.

Approximately 300 representatives of NASA, other government agencies and private industry are expected to attend the review meeting, which begins at 8:30 a.m. in MSFC's Morris Auditorium.

The contracted work, called a Phase B study, is intended to determine the design and definition of the RAM concept, which envisions modular spacecraft that will be used with the Space Shuttle and Space Station as laboratory and observatory facilities in space. The RAMs would be transported into Earth orbit in the cargo bay of a shuttle and operated either attached to the shuttle or free-flying nearby. Later RAM versions would be attached to a Space Station.

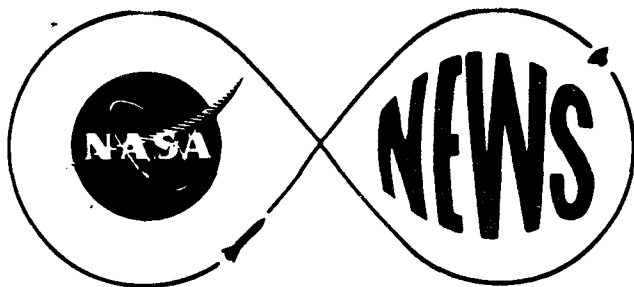
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November 24, 1971

The December 1 review will concentrate on the results of General Dynamics' work on a specific set of RAM payload carriers. Preliminary design of the craft will be completed during the remainder of the study.

General Dynamics, teamed with several United States and European subcontractors, began the Phase B study in May 1971. It includes preliminary design, operational analyses, program planning, and engineering mockup development of critical RAM components. The study is scheduled to end in August 1972.

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Marshall Space Flight Center,  
Ala. 35812

Charles Kurtz, 205/453-0034  
(Residence, 615/433-4958)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-219

## LARGE SPACE TELESCOPE STUDY BEGINS

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration has selected Itek Corp., Lexington, Mass., to perform a large space telescope definition study.

The \$400,000 contract will run for 12 months. It was awarded by the NASA-Marshall Space Flight Center.

The space agency plans to provide to the astronomical community a three meter (120-inch), high resolution optical telescope in space in the 1980's. Such a large diameter telescope operating above the earth's atmosphere will significantly extend man's knowledge of the universe.

The large space telescope program could include two flights, a precursor mission in the late 1970's and a final version in the early 1980's. The early version would provide an instrument for astronomical analysis beyond the capability of all ground-based telescopes, and at the same time provide scientific and technological knowledge for the later, more advanced instrument.

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November 24, 1971

Itek will consider conceptual designs of the large space telescope which are compatible with a Research and Applications Module (RAM). RAM and other systems are now being defined by NASA for operation with an earth orbiting Space Station or a Space Shuttle reusable transportation system. The large space telescope is one RAM payload proposed for the shuttle in the late 1970's.

The RAM carrying the large space telescope would be orbited by either a reusable shuttle vehicle or a Titan III launch vehicle.

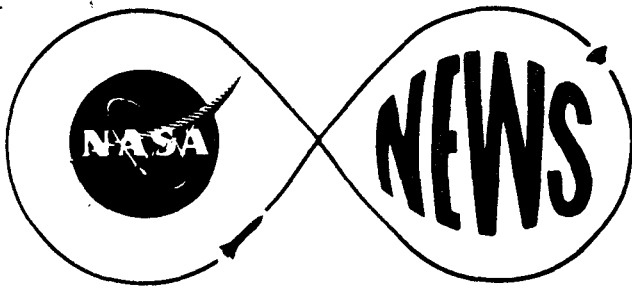
For the purposes of this study, the large space telescope would be placed in a 630-810 kilometer (350-450 nautical mile) orbit; the telescope would have a five-year lifetime; the scientific instrument would be designed with the capability for on-orbit maintenance and retrofitting by astronauts; and the telescope would be a national facility capable of operation by many astronomers.

Itek will be supported in this study by Kollsman Instrument Corp. and Martin Marietta Corp.

The large space telescope program is a project sponsored by the NASA Office of Space Sciences and Applications. Garvin Emanuel of the Mission and Payload Planning Office, Program Development, is directing the work for the Marshall Center.

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SPACE ADMINISTRATION**  
Marshall Space Flight Center,  
Ala. 35812

Joe Jones, 205/453-0034  
(Residence, 205/852-8847)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-225

## CONCEPT VERIFICATION ROLE ASSIGNED TO MSFC

MARSHALL SPACE FLIGHT CENTER, Ala. -- A new research and development activity which relates to possible manned missions of the future has been assigned to the Marshall Space Flight Center by the NASA associate administrator for manned space flight, Dale Myers.

Dr. Eberhard Rees, MSFC director, said that Marshall will be the lead center within the NASA manned space flight organization for this new effort, which is known as "concept verification testing" (CVT).

"This responsibility involves an in-house system design and integration effort established as a tool to verify the concepts/hardware resulting from NASA definition studies now underway. The lead role of the center includes development of the management approach and integration of the technical skills and capabilities of the manned space flight centers for the CVT program," Dr. Rees said.

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November 30, 1971

The work will be mainly related to verifying concepts which have been advanced in connection with NASA studies of prospective future projects, including a modular Space Station, a series of Research and Applications Modules (RAM's) and the so-called Sortie Can which is a versatile, inexpensive approach to providing a payload carrier for the Space Shuttle.

All three would be launched by the Space Shuttle.

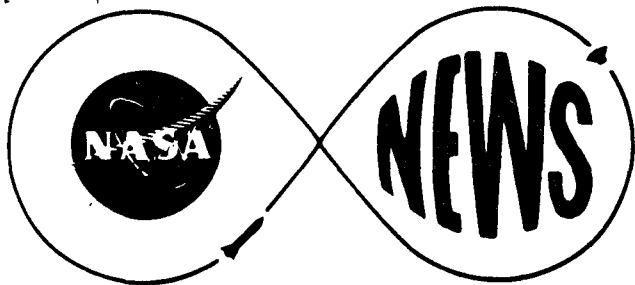
The CVT program at Marshall is expected to make use of a number of mockups in which design ideas will be tried out by working with the potential user to obtain his thoughts and recommendations. It is the current plan, for instance, to test Space Station and RAM living and working concepts in a simulator which would be occupied for a number of weeks by experimenters on a simulated space journey.

Dr. Rees said the primary purposes of the CVT program are:

1. To demonstrate representative shuttle payload concepts (in the RAM and Space Station module class).
2. To develop shuttle/payload interface requirements from the payload and users viewpoint.
3. To demonstrate to potential users some of the shuttle capabilities for research and applications.
4. To support the design and development of the Sortie Can.
5. To investigate integration and operational techniques for long duration mission systems suitable for more ambitious RAM's and for an eventual Space Station.

The CVT program is managed within Marshall's Program Development directorate, as a part of the Space Station Task Team which is headed by William Brooksbank. Within the Space Station group, Konrad K. Dannenberg will head the CTV work. The Science and Engineering directorate, which has an extensive responsibility for CVT efforts within Marshall laboratories, has named Robert S. Garrett of the Products Office as CVT project engineer.

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SPACE ADMINISTRATION**  
Marshall Space Flight Center,  
Ala. 35812

Maurice Parker, 205/453-0034  
(Residence - 205/859-0121)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-226

## SCIENCE PANEL MEETS

MARSHALL SPACE FLIGHT CENTER, Ala. -- A meeting of the National Aeronautics and Space Administration's Comet and Asteroid Missions Science Panel, chaired by Dr. Ernst Stuhlinger, associate director for science of the Marshall Space Flight Center, is being held today at the Marshall Center.

Nine scientists from education and government institutions are attending.

This is the second of three meetings in which present and prospective efforts in the field of planetary and interplanetary probes are being discussed. The first session was held here in October, and the third will be held early next year, probably at the Manned Spacecraft Center of NASA.

The visiting scientists are Dr. Hannes Alfvén and Dr. Gustaf Arrhenius, both of the University of California at San Diego; Dr. Roger Bourke, Jet Propulsion Laboratory, Pasadena, Calif.; Dr. Bruce Doe,

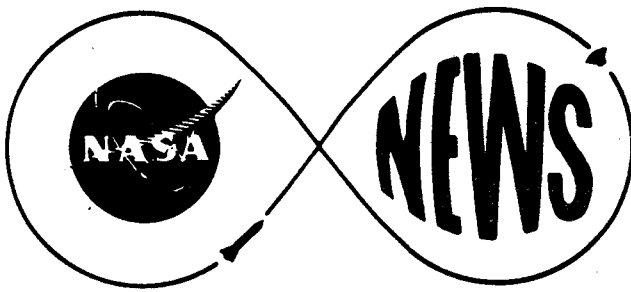
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November 30, 1971



U. S. Geological Service, Denver; Mr. Stephen Dwornik, NASA Hq.  
Office of Space Science and Applications; Dr. Alan Friedlander, Illinois  
Institute of Technology Research Institute, Chicago; Dr. Thomas Gehrels,  
University of Arizona, Tucson; Dr. David Strangway, Manned Spacecraft  
Center, Houston; and Dr. Fred Whipple, Smithsonian Astronomical  
Observatory, Cambridge, Mass.

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Marshall Space Flight Center,  
Ala. 35812

Charles Kurtz, 205/453-0034  
(Residence, 615/433-4958)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-230

## TWO FIRMS STUDY PRESSURE-FED ENGINES

MARSHALL SPACE FLIGHT CENTER, Ala. -- The National Aeronautics and Space Administration has awarded two contracts for feasibility studies of a pressure-fed engine for a water recoverable Space Shuttle booster.

Contracts have been awarded to TRW, Inc., Redondo Beach, Calif., and Aerojet General Corp., Sacramento, Calif., by the NASA-Marshall Space Flight Center.

The TRW contract totals \$400,000 and the Aerojet General Corp. received an award of \$367,595. The four-month studies will end Feb. 29, 1972.

The two aerospace firms will investigate the feasibility, cost effectiveness and preliminary design of a pressure-fed engine system for the water recoverable Space Shuttle booster.

NASA recently assigned five firms to do further study work on the shuttle booster. The primary purpose of these engine studies is to support the booster vehicle contractors during their study effort by providing technical and cost information.

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December 7, 1971

The Space Shuttle is planned by NASA as a reusable vehicle to transport people and cargo between Earth and low Earth orbit.

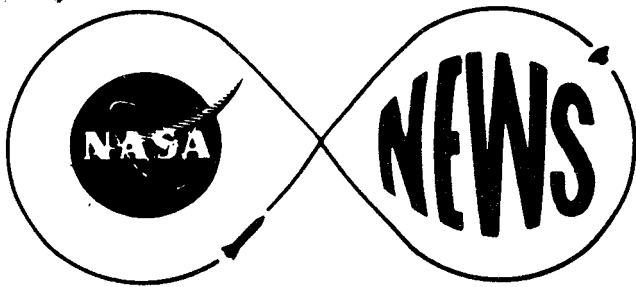
Earlier shuttle studies called for a two-stage vehicle, each stage powered by high-pressure hydrogen engines. Both stages would return to the launch site and land horizontally, like airplanes. In this pressure fed booster concept, the orbiter stage would operate as described, but the booster's propellants would be moved to the engines by pressure in the tanks instead of being driven by pumps, and the booster stage would land in the ocean and be recovered.

The type of pressure-fed booster engines used would depend upon the type of vehicle selected.

Both "series" and "parallel" burn boosters are being considered in these studies. The series burn concept calls for a single shuttle booster to lift the orbiter to about 58 kilometers (36 statute miles ) altitude before the orbiter engines ignite. Engines in the 450,000 to 630,000 newton (one million to 1.4 million pound thrust) range will be studied for this application.

The parallel burn concept calls for booster engines and orbiter engines to be ignited at liftoff. Booster engines in the 222,000 to 270,000 newton (500,000 to 600,000 pound) range will be considered for this application. The parallel burn booster approach would use smaller twin boosters, with both to be recovered.

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SPACE ADMINISTRATION**  
Marshall Space Flight Center,  
Ala. 35812

Maurice Parker, 205/453-0034  
(Residence, 205/859-0121)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-232

## OFFSHORE OIL AND GAS OPERATIONS STUDIED

MARSHALL SPACE FLIGHT CENTER, Ala. -- A team of technical experts from the NASA-Marshall Space Flight Center and two subsidiary facilities has completed a study of offshore oil and gas operations for the Department of the Interior's U. S. Geological Survey (USGS).

Recommendations of the NASA team should help improve safety and anti-pollution equipment used in offshore oil and gas operations, according to the USGS. The recommendations are included in a report submitted to USGS at the end of the 60-day study.

Hollis M. Dole, Interior Department Assistant Secretary for Mineral Resources, said of the team's report:

"Based on our initial review of the NASA study, we believe it offers a number of good suggestions for strengthening and improving operations on the outer continental shelf."

The team suggested several ideas that may assure the production of offshore resources with reasonable safety and protection from pollution of the marine and coastal environment.

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December 10, 1971

The NASA study team was headed by Morris K. Dyer of the Marshall Center. Other members were Dewey G. Little, alternate chairman, NASA-Mississippi Test Facility, Bay St. Louis; Alfred C. Taylor and Rayford L. Campbell, NASA-Michoud Assembly Facility, New Orleans; and Earl G. Hoard, MSFC-Huntsville. Dyer is manager of MSFC's Manned Flight Awareness Office; all the team members are experienced in quality, product and systems control and management.

The idea for the study was initiated in August 1970 in talks between Jackson M. Balch, MTF manager, and the USGS director.

Balch suggested that NASA's experience in developing techniques to assure the near-perfect quality of complex aerospace systems might be helpfully applied to the offshore oil and gas industry.

The study began in mid-August 1971 and was completed in early October. The report was made public December 8 by Secretary of the Interior Rogers P. Morton during a Congressional hearing concerning recovery of fossil fuel deposits from the Atlantic Ocean's continental shelf.

The NASA study was confined to the Federally managed outer continental shelf in the Gulf of Mexico, extending from the 5.8-kilometer (three-mile) limit, where state management ends, to the 200-meter (656-foot) water depth. The team's recommendations apply, however, to all outer shelf operations.

About 50 operators work in the **Gulf** from almost 1,900 permanent platforms. More than 6,200 wells are producing in water as deep as

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114 meters (375 feet) and as far as 113 kilometers (70 miles) from shore. Offshore oil production in the Gulf represents 15 to 18 per cent of total U. S. production.

The Marshall Center group worked in close cooperation with the USGS and industrial representatives. Team chairman Dyer said;

"We took the approach that we might be of some help because of NASA's and the Marshall Center's past experience in quality control and failure effects analysis. We didn't go into the study with the idea that we knew all the answers to the problems, nor that all of NASA's procedures should be used by the USGS and the oil industry. We had the full cooperation of both groups."

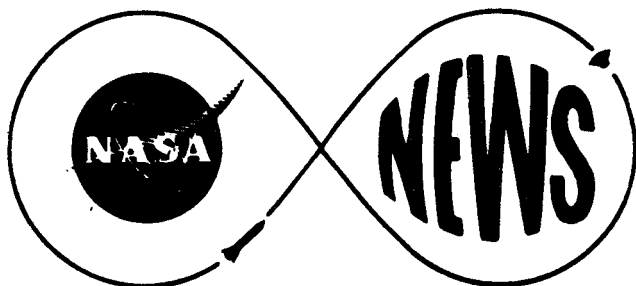
Elmo G. Hubble of the USGS was liaison with the team. Advice was also provided by Louis Fabian, Lyle Curran and C. T. Paludin of the Marshall Center, Haggi Cohen of NASA Headquarters, and many industry people.

Team members made several trips to oil platforms in the Gulf for firsthand observation and study, talked to scores of knowledgeable managers and workers, and reviewed reams of written material on the petroleum industry.

Team leaders Dyer and Little will review the NASA report December 16 in a New Orleans meeting with USGS acting director W. A. Radlinski, other USGS officials, and officials of about 50 oil and gas companies that operate on the Gulf outer continental shelf.

Copies of the NASA report are available from the Office of the Director, U. S. Geological Survey, 18th and F Streets, N. W., Washington, D. C. 20242.

NASA-MSFC



**NATIONAL AERONAUTICS AND  
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Marshall Space Flight Center,  
Ala. 35812

Charles Kurtz, 205/453-0034  
(Residence, 615/433-4958)

**FOR RELEASE:**  
Upon Receipt  
Release No. 71-241

## SKYLAB DOCKING UNIT ACCEPTED

MARSHALL SPACE FLIGHT CENTER, Ala. -- The flight Multiple Docking Adapter (MDA) for Skylab was accepted by the NASA-Marshall Space Flight Center this week at the Martin Marietta Corp. facility in Denver, Colo.

The MDA is a major module of Skylab hardware being readied for launch in 1973. The Marshall Center designed and fabricated the MDA structure. Martin Marietta installed, integrated and tested the MDA subassemblies and functional equipment at its Denver facility.

The flight MDA will be transported from Denver to the McDonnell Douglas Astronautics Co. facility in St. Louis, Mo., on December 21 aboard the Super Guppy aircraft.

Upon arrival at McDonnell Douglas, the MDA will be mated with the Airlock Module (AM), which is being manufactured by McDonnell Douglas in St. Louis.

Following the mating of the two modules, all systems will be tested and verified. Upon completion of systems verification, the

-more-

December 17, 1971

mated modules will be placed in a large altitude chamber where both unmanned and manned simulated missions will be run. The altitude chamber simulates the Skylab orbital altitudes.

The MDA will provide docking facilities for the Apollo spacecraft during the Skylab missions and will also serve as a major experiment control center. The module is approximately 17 feet long, 10 feet in diameter and weighs 13,800 pounds.

Skylab will build upon the foundation laid in the earlier manned space flight programs -- Mercury, Gemini and Apollo. There will be more than 50 scientific and technological experiments conducted aboard the spacecraft, most of them in the areas of Earth resources, solar astronomy and biomedicine -- further efforts to determine the long term effects of weightlessness on man.

From the practical view, among Skylab's objectives are the development of sensing techniques which will provide a wide range of information in such areas as agriculture, oceanography and geology -- information which man can use to inventory resources on Earth and plan their use. For example, crop and forestry diseases can be located from space more quickly than they can from Earth; fish movements can be detected from space; underground water and mineral deposits can be found through the use of equipment and techniques being developed for Skylab.

Three three-man crews will man the Skylab for visits of from 28 to 56 days.